Hook and Line Survey of Lingcod (*Ophiodon elongatus*) and Rockfish (*Sebastes spp.*) in Northern Strait of Georgia (Statistical Areas 13, 14, 15 and 16) June 14-July 9, 2004

D.R. Haggarty and J.R. King

Fisheries and Oceans Canada
Science Branch, Pacific Region
Pacific Biological Station
Nanaimo, B.C.
V9T 6N7

2005

Canadian Technical Report of Fisheries and Aquatic Sciences 2590

Fisheries and Oceans / Pêches et Océans

Canada

Canadian Technical Report of Fisheries and Aquatic Sciences

Technical reports contain scientific and technical information that contributes to existing knowledge but which is not normally appropriate for primary literature. Technical reports are directed primarily toward a worldwide audience and have an international distribution. No restriction is placed on subject matter and the series reflects the broad interests and policies of the Department of Fisheries and Oceans, namely, fisheries and aquatic sciences.

Technical reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report is abstracted in *Aquatic Sciences and Fisheries Abstracts* and indexed in the Department's annual index to scientific and technical publications.

Numbers 1 - 456 in this series were issued as Technical Reports of the Fisheries Research Board of Canada. Numbers 457 - 714 were issued as Department of the Environment, Fisheries and Marine Service Technical Reports. The current series name was changed with report number 925.

Technical reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page. Out-of-stock reports will be supplied for a fee by commercial agents.

Rapport technique canadien des sciences halieutiques et aquatiques

Les rapports techniques contiennent des renseignements scientifiques et techniques qui constituent une contribution aux connaissances actuelles, mais que ne sont pas normalement appropriés pour la publication dans un journal scientifique. Les rapports techniques sont destinés essentiellement à un public international et ils sont distribués à cet échelon. Il n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques du ministère des Pêches et des Océans, c'est-à-dire les scences halieutiques et aquatiques.

Les rapports techniques peuvent être cités comme des publications complètes. Le titre exact paraît au-dessus du résumé de chaque rapport. Les rapports techniques sont résumés dans la revue *Résumés des sciences aquatiques et halieutiques*, et ils sont classés dans l'index annual des publications scientifiques et techniques du Ministère.

Les numéros 1 à 456 de cette série ont été publiés à titre de rapports techniques de l'Office des recherches sur les pêcheries du Canada. Les numéros 457 à 714 sont parus à titre de rapports techniques de la Direction générale de la recherche et du développement, Service des pêches et de la mer, ministère de l'Environnement. Les numéros 715 à 924 ont été publiés à titre de rapports techniques du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 925.

Les rapports techniques sont produits à l'échelon regional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

Canadian Technical Report of

Fisheries and Aquatic Sciences 2590

2005

HOOK AND LINE SURVEY OF LINGCOD (*Ophiodon elongatus*) AND ROCKFISH (*Sebastes spp.*) IN NORTHERN STRAIT OF GEORGIA (STATISTICAL AREAS 13, 14, 15 AND 16) JUNE 14-JULY 9, 2004

by

D.R. Haggarty and J.R. King

Fisheries and Oceans Canada
Science Branch, Pacific Region
Pacific Biological Station
Nanaimo, B.C.
V9T 6N7

© Her Majesty the Queen in Right of Canada, 2005
Cat No. Fs 97-6/2590E ISSN 0706-6457

Correct citation for this publication:

Haggarty, D.R., and King, J.R. 2005. Hook and line survey of Lingcod (*Ophiodon elongatus*) and Rockfish (*Sebastes spp.*) in northern Strait of Georgia (statistical areas 13, 14, 15 and 16) June 14-July 9, 2004. Can. Tech. Rep. Fish. Aquat. Sci. 2590: 57p.

TABLE OF CONTENTS

LIST OF TABLES iv
LIST OF FIGURES v
ABSTRACT vi
RÉSUMÉ vii
INTRODUCTION 1
METHODS 2
Catch Per Unit of Effort Analyses 3
RESULTS 4
Catch Rates 4
Biological Data 6
Diet Analysis 6
DISCUSSION 7
ACKNOWLEDGEMENTS 7
REFERENCES 8

LIST OF TABLES

Table 1. Descriptive statistics for lingcod Catch Per Unit of Effort (LCPUE) (fish/hour) and Total fish CPUE (TCPUE) for each fisher, June 14-July 9, 2004 10
Table 2. Descriptive statistics for CPUE indices for lingcod (LCPUE), total fishes (TCPUE), copper rockfish (CCPUE) and quillback rockfish (QCPUE) caught on light (7 kg) and heavy (11 kg) leaders in Statistical Area 15 and 16, June 14-July 9, 2004 10
Table 3. Descriptive statistics for Lingcod, Copper rockfish and Quillback CPUE (fish/hour) for each depth stratum over all areas and by statistical area, June 14-July 9, 2004 11
Table 4. Inter-annual comparison of lingcod CPUE (fish/hour) by statistical area and depth stratum 12
Table 5. Inter-annual comparison of copper and quillback rockfish catch rates (CPUE fish/hour) by statistical area and depth stratum 13
Table 6. Length of male and female lingcod, captured June 14-July 9, 2004, by depth stratum and Statistical Area 14
Table 7. Length of male and female lingcod caught in each sampling year by statistical area 15
Table 8. Maturity classes of male and female lingcod, captured June 14-July 9, 2004 15
Table 9. Summary of stomach content analysis of lingcod captured in the Strait of Georgia, June 14 – August 3, 2004 16
Table 10. Prey items identified in stomach content analysis of lingcod captured in the Strait of Georgia, June 14 – August 3, 2004 16

105-05570/

LIST OF FIGURES

Figure 1. Locations of sites in Statistical Areas 13 and 15 of the Strait of Georgia sampled June 14-July 9, 2004. 17
Figure 2. Locations of sites in Statistical Areas 14, 16 and 17 of the Strait of Georgia sampled June 14-July 9, 2004. 18
Figure 3. Boxplot representing lingcod CPUE (fish/hour) by depth stratum in Statistical Area 13, June 14-July 9, 2004. 19
Figure 4. Boxplot representing lingcod CPUE (fish/hour) by depth stratum in Statistical Area 15, June 14-July 9, 2004. 20
Figure 5. Boxplot representing lingcod CPUE (fish/hour) by depth stratum in Statistical Area 16, June 14-July 9, 2004. 21
Figure 6. Boxplot representing copper rockfish CPUE (fish/hour) by depth stratum in Statistical Area 13, June 14-July 9, 2004. 22
Figure 7. Boxplot representing copper rockfish CPUE (fish/hour) by depth stratum in Statistical Area 15, June 14-July 9, 2004. 23
Figure 8. Boxplot representing copper rockfish CPUE (fish/hour) by depth stratum in Statistical Area 16, June 14-July 9, 2004. 24
Figure 9. Boxplot representing the quillback rockfish catch per unit of effort (fish per hour) by depth stratum in Statistical Area 13, June 14-July 9, 2004. 25
Figure 10. Boxplot representing the quillback rockfish catch per unit of effort (fish per hour) by depth stratum in Statistical Area 15, June 14-July 9, 2004.. 26
Figure 11. Boxplot representing the quillback rockfish catch per unit of effort (fish per hour) by depth stratum in Statistical Area 16, June 14-July 9, 2004.. 27
Figure 12. Length frequency histogram for female lingcod caught in the Hook and Line Survey in Statistical Areas 13-17, June 14-July 9, 2004..... 28
Figure 13. Length frequency histogram for male lingcod caught in the Hook and Line Survey in Statistical Areas 13-17, June 14-July 9, 2004..... 29
Figure 14. Boxplot representing the female lingcod length by statistical area, June 14-July 9, 2004. 30
Figure 15. Boxplot representing the male lingcod length by statistical area, June 14-July 9, 2004..... 31
Figure 16. Boxplot representing A) male and B) female lingcod length by year. 32

ABSTRACT

Haggarty, D.R., and King, J.R. 2005. Hook and line survey of Lingcod (*Ophiodon elongatus*) and Rockfish (*Sebastes spp.*) in northern Strait of Georgia (statistical areas 13, 14, 15 and 16) June 14-July 9, 2004. Can. Tech. Rep. Fish. Aquat. Sci. 2590: 57p.

Research fishing methods using hook and line gear were developed in 1984 and 1985 to assess near shore reef fish abundance in the Strait of Georgia. Several hook and line surveys for rockfishes and lingcod were subsequently completed between 1985 and 1993 using these methods at study sites in Statistical Areas (SA) 13, 15 and 16. From June 14-July 9, 2004, we revisited these study sites and fished using similar gear and methodology. We compare our catch per unit of effort (CPUE) data to historical CPUE in SA 13 with 1986, 1987 and 1988; in SA 15 with 1985; and in SA 16 with 1985 and 1986. In addition, we surveyed sites in SA 14 and the shallow stratum of SA 17. Lingcod catch rates have increased over time in SA 13 and 15 but not in SA 16. In SA 13, lingcod catch rates were greater than 1987 and 1988 but were not different from 1986. 2004 lingcod catch rates in SA 15 exceed 1985 catch rates. The size of male and female lingcod in SA 13, 16 and male lingcod in SA 15 also increased in 2004. SA 13, 15 and 16 had higher lingcod catch rates than SA 14 and 17. In SA 13, copper rockfish catch rates in the shallow stratum were significantly lower in 2004 and 1987 than in 1986 or 1988. Copper rockfish catches were uniformly low in the deep depth strata of SA 15 and 16 in all years. Quillback rockfish catch rates were lower in the shallow stratum in 2004 in SA 13 and 16. Quilback catch rates may be affected by a change in leader strength; however, we attempt to correct for any bias introduced by this change.

RÉSUMÉ

Haggarty, D.R., and King, J.R. 2005. Hook and line survey of Lingcod (*Ophiodon elongatus*) and Rockfish (*Sebastes spp.*) in northern Strait of Georgia (statistical areas 13, 14, 15 and 16) June 14-July 9, 2004. Can. Tech. Rep. Fish. Aquat. Sci. 2590: 57p.

En 1984 et en 1985, des méthodes de pêche scientifique à la ligne ont été mises au point pour évaluer l'abondance des poissons de récifs côtiers dans le détroit de Georgia. De 1985 à 1993, plusieurs relevés des sébastes et de la morue-lingue ont été effectués selon ces méthodes à des stations situées dans les zones statistiques (ZS) 13, 15 et 16. Du 14 juin au 9 juillet 2004, nous sommes retournés à ces stations et y avons pêché au moyen d'engins semblables et selon la même méthode. Nous comparons nos données de captures par unité d'effort (CPUE) à celles de 1986, de 1987 et de 1988 pour la ZS 13, à celles de 1985 pour la ZS 15 et à celles de 1985 et de 1986 pour la ZS 16. En outre, nous avons effectué des relevés à certains endroits de la ZS 14 et dans la strate peu profonde de la ZS 17. Les taux de capture de morues-lingues ont augmenté avec le temps dans les ZS 13 et 15, mais pas dans la ZS 16. Dans la ZS 13, les taux de capture de morues-lingues en 2004 étaient plus élevés qu'en 1987 et en 1988, mais ne différaient pas de ceux observés en 1986. Dans la ZS 15, les taux de capture des morues-lingues étaient plus élevés en 2004 qu'en 1985. La taille des morues-lingues mâles et femelles dans les ZS 13 et 16, ainsi que celle des morues-lingues mâles dans la ZS 15 ont augmenté en 2004. Les taux de capture des morues-lingues dans les ZS 13, 15 et 16 étaient plus élevés que dans les ZS 14 et 17. Dans la ZS 13, les taux de capture des sébastes cuivrés dans la strate peu profonde étaient significativement moins élevés en 2004 et en 1987 qu'en 1986 ou en 1988. Les captures de sébastes cuivrés étaient toujours faibles dans les strates profondes des ZS 15 et 16. Les taux de capture des sébastes à dos épineux étaient moins élevés en 2004 dans la strate peu profonde des ZS 13 et 16. La modification de la résistance des avançons utilisés pourrait avoir influé sur le taux de capture des sébastes à dos épineux, mais nous avons tenté de corriger le biais introduit par ce changement.

INTRODUCTION

Lingcod (*Ophiodon elongatus*) populations in the Strait of Georgia appear to have been at a very low level of abundance for several decades (Richards and Hand 1989; King 2001). In response to conservation concerns, the commercial fishery was closed in 1990. The recreational fishery, prior to 2002, was subject to regulations including a winter non-retention period to protect nest guarding males, non-retention of fish less than 65 cm, a one per day bag limit, and an annual catch limit of 10 lingcod per year. In 2002, the recreational fishery was closed for the retention of lingcod as an additional measure to protect this stock (King and Surry 2000).

A stock assessment framework for lingcod recommended development of fishery independent sources of relative abundance to monitor changes in the Strait of Georgia lingcod population (King *et al.* 2003). One recommendation was to resume the hook and line surveys of nearshore reef fishes conducted in the Strait of Georgia in 1985, 1987-88 and 1993. In 1984 hook and line surveys were developed to estimate lingcod and rockfish catch per unit of effort (CPUE) and were then conducted in the Northern Strait of Georgia (Statistical Areas (SA) 13, 15 and 16) in 1985-1988 (Richards and Cass 1985, Richards *et al.* 1985, Richards and Cass 1987, Richard and Hand 1987). In SA 15 and 16, the survey area was divided into 1 minute latitude by 1 minute longitude blocks, and those blocks encompassing known lingcod fishing areas were identified (Richards *et al.* 1985). In SA 13, fishing sites were chosen from known areas of commercial fishing (Richards and Cass 1987). Sites in SA 13 were sampled in 1986, 1987, and 1988; SA 15 in 1985; and SA 16 in 1985 and 1986.

Between June 14 and July 9, 2004, we conducted a hook and line survey in SA 13, 15 and 16, re-visiting the same sites sampled in previous years. In addition, we sampled five new sites in SA 14 and five sites in SA 17 that were sampled in the fall of 2003 (Haggarty and King 2004).

While the primary focus of this survey was to investigate the relative abundance of lingcod, other nearshore reef fishes such as rockfishes (*Sebastes* spp.), kelp greenling (*Hexagrammos decagrammus*), cabezon (*Scorpaenichthys marmoratus*) and spiny dogfish (*Squalus acanthias*) were caught in all survey years. The 2004 lingcod survey provides an index of relative abundance for copper rockfish (*S. caurinus*) and quillback rockfish (*S. maliger*) in addition to lingcod. Nearshore rockfish species in the Strait of Georgia have suffered serious declines in abundance (Yamanaka and Lacko, 2001). A rockfish conservation strategy that includes a reduction in fishing mortality, the implementation of rockfish protection areas, improved catch monitoring and stock assessment has been implemented.

METHODS

The vessel used as a platform for fishing was a 6.7 m aluminium "Lifetimer" boat equipped with twin 115-horse power engines, a depth sounder, GPS, and laptop computer with the geographic positioning software "Nobeltech®" and the program "Tides and Currents®". Fishing was conducted using the handline survey methodology developed by Richards *et al.* (1985) and Richards and Cass (1985).The fishing crew consisted of four research personnel, with three or four people fishing at a time (depending on environmental conditions). We used Zebco® Rhino® rods with Rhino® RBCXL or Shakespeare ® Tidewater ® 30LCL reels, rigged with 13.6 kg (30 lb) test mono-filament line and a 170 g (6 oz) mooching weight. Two single Mustad #92553 size 3/0 hooks with a 6 cm spacing were tied with 11 kg (25 lb) test mono-filament leader. We used 12 cm frozen herring as bait, hooked through the snout and just in front of the dorsal fin. Previous surveys used 9 kg (20 lb) test mono-filament with a 7 kg (15 lb) leader. We used stronger line for the leaders than previous surveys to minimize the loss of lingcod due to line breakage. To test for the effect of leader strength on catch rates, we fished with both the light (7 kg) and heavy (11 kg) leaders in SA 15 and 16 with one (randomly selected) fisher using the light (7 kg) leader.

We revisited sample sites surveyed in SA 13 in 1986, 1987 and 1988; SA 15 in 1985; and SA 16 in 1985 and 1986 (Figures 1 and 2). All sites represented areas of presumed lingcod (age 2+) and rockfish habitat. New sample sites were chosen in order to extend the spatial coverage of this survey into SA 14. We also revisited five sample sites in SA 17 that were sampled in the October 2003 hook and line survey (Haggarty and King 2004) in order to compare fall catch rates in SA 17 to SA sampled in the summer. Due to time constraints, only the shallow stratum was fished in SA 17. All sites consisted of rocky reefs of appropriate depths as indicated on nautical charts.

We sampled two depth strata per site (0-25 m, 26-50 m). These are different strata than those used in previous surveys, and correspond to depth strata that were sampled in the 2003 survey of the southern Strait of Georgia (Haggarty and King 2004) as well as the 1993 survey of SA 18 and 19 (Yamanaka and Murrie 1995). Three depth strata were sampled in the previous surveys in SA 13, 15 and 16 (5-40 m, 41-70 m, and 71-100 m). We eliminated the deepest depth stratum to avoid yelloweye rockfish bycatch, and because lingcod catches declined with increasing depth in previous surveys (King *et al.* 2003). We used different, shallower depth strata (0-25 m, 26-50 m) because lingcod, copper rockfish and quillback rockfish catch rates often vary between the 0-25 m and 26-50 m, and depth strata with a more narrow range should reduce overall variability of catch rates. In order to compare the 2004 data to previous surveys, fishing sets from the 1980s were re-classified into our depth strata using their modal depth, the depth at which most of the fishing occurred. Sets with modal depths exceeding 50 m and maximum depths exceeding 55 m were excluded from the analysis.

As in previous studies, fishing effort was defined as the total fishing time of all fishers. Each fisher kept track of fishing time, which represented the time the line was on or near

the bottom, using a digital stop watch strapped to the butt of the rod. Fishing time started when the fishing gear touched the bottom and stopped whenever a fish was hooked, there was a bite, the gear become fouled on the bottom, or the line was reeled in. Fishing effort on the light (7 kg) leader was counted separately.

Each site and depth stratum was fished for a total of 30 minutes of bottom time. In SA 15 and 16, the 30 minutes did not include time spent fishing with the light (7 kg) leader . We adjusted our position within the site if no fish were caught within 5 minutes, if we felt we were no longer in appropriate lingcod habitat, or if we were no longer within the depth stratum. Variables recorded for each set included weather, tide, currents, sea state and the minimum, maximum and modal depths encountered. We stopped fishing if currents or wind were too strong for fishing to be effective.

A catch was recorded if a fish was brought to the surface and could be identified to species. Lingcod, rockfishes and kelp greenling were sampled for fork length (mm), weight (g), sex, and stage of maturity. Fin rays of lingcod and otoliths of rockfishes were collected for age estimation. Fork or total length for other species was measured before releasing them. Lingcod stomach contents were identified to the lowest taxonomic group possible. Stomachs were examined while fish were still relatively fresh and the volume (cm^3) of primary, secondary and tertiary prey items were estimated using a graduated cylinder.

Catch Per Unit of Effort Analyses

Catch per unit of effort (CPUE) was calculated as the number of fish per hour (fish/hr) for total fishes (all species together), lingcod, copper rockfish and quillback rockfish. Effort was the total fishing time of all fishers. CPUE and effort were counted separately for time spent fishing with the light leader, and fish caught on the light leader were not included in the calculation of the overall CPUE. CPUE was also calculated for total fishes and for lingcod for each fisher in order to investigate bias among fishers.

Difference among catch rates of each fisher was investigated using the Kruskal-Wallis test (non-parametric ANOVA). Differences in median CPUE and lingcod length between depth strata and statistical areas were tested with the Mann-Whitney test (non-parametric t-test, test statistic U) and Kruskal-Wallis test (non-parametric ANOVA, test statistic H) respectively. CPUEs were compared between years by depth strata using the Kruskal-Wallis test or Mann-Whitney test. Male and female lingcod lengths were compared using the Mann-Whitney test. Difference in lingcod length between depth stratum and among years was investigated with the Mann-Whitney or Kruskal Wallace test. When significant differences were obtained with the Kruskal-Wallis test, we used a comparison of mean ranks procedure to compare the individual mean ranks of the different groups and to identify subsets of similar mean ranks (Analytical Software, 2000). All analyses were performed using Statistix software (Analytical Software, 2000).

For SA 15 and 16, catch rates for the heavy (11 kg) and light (7 kg) leaders were compared using a two-tailed Wilcoxon signed rank test with continuity correction. We also compared the number of line breakages for each type of leader using the Chi-squared test with the Yates correction for continuity.

RESULTS

We sampled thirty-five sites from June 14-July 9, 2004 (Figures 1 and 2). We fished for a total of 33.6 hours (bottom time) over the entire survey. Total fishing time in SA 13 was 11.2 hours; 11.9 hours in SA 14; and a total of 13.3 and 12.7 hours in SA 15 and 16 respectively. An additional 3.9 hours were accumulated in SA 17 (shallow stratum only). Location, depth, time and environmental data for each set are reported in Appendix Table 1. Appendix Table 2 presents the catch and effort data for each set including the effort by each fisher. Length, weight, sex and stage of maturity data for lingcod, copper rockfish, quillback rockfish and dogfish are presented in Appendix Tables 3-6. Biological data from all other species are in Appendix Table 7.

Catch Rates

Individual Fishers

We compared the total and lingcod CPUEs among the four primary fishers and found no significant differences in catch rates (Table 1), indicating that the individual catch rates are comparable. Therefore, further analyses were done using the cumulative catch rates rather than individual fisher CPUEs.

Light vs. Heavier Leaders

The change in leader strength may have affected catch rates. To verify this, we compared catch rates on light (7 kg) and heavy (11 kg) leader using a Wilcoxon signed rank test (Table 2). Catch rates for lingcod and copper rockfish were not affected by leader strength; however, quillback (and therefore total fish catch rates) was significantly different. Both quillback rockfish CPUE and total fish CPUEs were greater using the light (7 kg) leader (Table 2). The mean quillback CPUE was approximately 2.5 times higher using the light (7 kg) leader than the heavy (11 kg) leader.

We also recorded the number of breakages of each type of leader in SA 15 and 16. The light (7kg) leader broke 6 times whereas the heavy (11 kg) broke 4 times. A Chi-squared test with the Yates correction for continuity showed that the light leader broke significantly more often than the heavy leader ($\chi^2_{0.05,1}=4.8$, $p=0.03$). However, neither leader broke very often.

Catch Rate by Depth and Area

We compared lingcod catch rates between depth strata with all statistical areas pooled and found that significantly higher lingcod catch rates occurred in the shallow depth stratum (Table 3). When each statistical area was considered separately, only area 14 showed significantly higher catches in the shallow strata (Table 3). Due to the significant

differences in catch rates between depth strata, we looked for differences in lingcod catch rates among statistical areas within each depth stratum. Lingcod catch rates were significantly higher in both depth strata in SA 13, 15 and 16 than SA 14 and than the shallow stratum of SA 17 (the deep stratum was not sampled in SA 17) (Table 3).

Copper rockfish catch rates were also higher in the shallow stratum than in the deep with all statistical areas pooled, and in SA 14, 15 and 16 when each statistical area was considered separately (Table 3). In addition, catch rates in SA 13 also tended to be higher in the shallow stratum, although this difference was not statistically significant (Table 3). There were no significant differences among statistical areas when catch rates were compared within each depth stratum.

Quillback catch rates showed the opposite trend, with significantly higher catches in the deep stratum with all statistical areas pooled, and in SA 13 when each statistical area was considered separately (Table 3). When statistical areas were compared within each depth stratum, there was no significant difference in catch rates in the shallow stratum; however, greater catch rates of quillback rockfish were observed in SA 13, 14 and 16 than in SA 15 in the deep stratum (Table 3).

Annual Catch Rate Comparisons

Lingcod, copper rockfish and quillback rockfish catch rates were compared among sampling year by depth stratum in SA 13, 15 and 16 (Tables 4 and 5, Figures 3–11). Lingcod catch rates improved significantly in both depth strata in SA 13 and 15 (Table 4). In SA 13, 2004 lingcod catch rates are significantly greater than 1987 and 1988, but are not different from 1986. There were no pair-wise differences in the deep stratum (Figure 3). Lingcod catch rates in SA 15 2004 exceeded rates from 1985 in both depth strata (Figure 3). Lingcod catch rates did not change among years in SA 16 in either depth stratum (Figure 4).

The only significant difference in copper rockfish catch rates among years occurred in the shallow depth stratum in SA 13 (Table 5). Catch rates were significantly lower in 2004 and 1987 than in 1986 or 1988 (Figure 5). Copper rockfish catches were uniformly low in the deep depth strata of SA 15 and 16 in all years (Figure 6 and 7).

Quillback rockfish catch rates differed among years in the shallow stratum in 13 and 16 (Table 5). In the shallow stratum of SA 13, three significantly different groups exist: 1986, 1987-1988, and 2004, with CPUE decreasing over time. Although not significant, a trend for lower catch rates in 2004 also exists in the deep stratum (Figure 8). Quillback catch rates in the shallow stratum of SA 16 were significantly lower in 2004 than 1986 and 1985 (Figure 10). 2004 catch rates in the deep stratum of SA 16 and both strata of SA 15 also tended to be lower in 2004 than in previous years, but the differences were not significant (Figure 9 and 10).

Difference in quillback rockfish CPUE between the light (7 kg) leader (used in previous surveys) and the heavy leader (11 kg) (used in this survey) makes annual comparisons difficult. However, in 2004, light leader were fished at all sites by one fisher in SA 15

and 16. Comparison of quillback CPUE using the 2004 light (7 kg) leader data in SA 15 and 16 to previous survey CPUEs indicated that the only significant decrease in CPUE over time occurred in the shallow depth strata in SA 16. These results were consistent with the results obtained using the heavy (11 kg) leader catch rates (Table 5). In addition the frequency of sets when no quillback were caught using the 7 kg and 11 kg leader was very similar or the same. In both SA 15 and 16, the proportion of zeros in the deep strata was the same for each leader type (67% in SA 15 and 55% in SA 16). In the shallow strata, slightly fewer sets had null catches of quillbacks using the light (7 kg) leader (67% vs. 78% in SA 15 and 73% vs. 82% in SA 16).

Biological Data

The mean length of male and female lingcod was 49.9 cm and 58.3 cm, respectively (Table 6, Figures 12 and 13). Female lingcod were significantly longer than males (Table 6). Significantly longer male and female lingcod were caught in the deep depth stratum than in the shallow stratum (Table 6). Longer male lingcod were caught in the shallow stratum of SA 16 and 13 than in SA 15. No other statistical differences in lingcod length among statistical areas exist (Figures 14 and 15).

Small sample sizes in some years precluded comparisons between depth strata across years. Both male and female lingcod sampled in the hook and line surveys have shown significant increases in size over time within the statistical areas sampled (Figure 16). Both male and female lingcod in SA 13 showed a significant increase in size over 1986 and 1988, and male lingcod size in 2004 increased over 1987 (Table 7). Only one female lingcod was captured in 1987; therefore, 1987 was excluded from the length analysis. Male lingcod caught in 2004 in SA 15 were significantly longer than those in 1986; however, there was no difference in female length (Table 7). Male and female lingcod caught in Area 16 in 2004 were greater in length than lingcod caught in 1986, but equal to 1985 (Table 7). Overall, there is a trend for increased size of both male and female lingcod (Figure 16).

Only 19% of the male lingcod were immature (Table 8). The majority of the male lingcod were either maturing (34%) or mature, but at the spent or resting stage (46%). Approximately 22% of the females were immature. As with the males, the majority of female lingcod were mature (49%), at the spent or resting stage (Table 8).

Diet Analysis

A total of 337 stomachs were examined (Table 9). Of these, 213 (63 %) were empty and 6 contained unidentified remains. The contents of the remaining 118 stomachs were identified to a general category (i.e. fish remains) or to species (Table 10). Most stomachs contained only one type of prey item (the "primary" prey), with only 13 stomachs containing "secondary" or "tertiary" prey items.

The most commonly consumed prey for lingcod captured in this study was fish, with 75% of the stomach examined containing unidentified fish, and a further 13% containing identifiable fish species (Table 10). The most common identified fish were Pacific herring (6%) and rockfish (3%). Shrimp and octopus were the most common identified invertebrates, at 12% and 10% of stomach contents respectively.

DISCUSSION

Based on the assumption that catch rates measured as catch per unit of effort (CPUE) can be used as a relative index of abundance of lingcod, then lingcod abundance has increased over time in Statistical Areas 13 and 15 but not in SA 16. In SA 13, 2004 lingcod catch rates were greater than 1987 and 1988 catch rates but were not different from 1986 catch rates. Note that a dramatic drop in lingcod catch rates occurred in the shallow depth stratum in 1987 and the deep stratum in 1988 in SA 13 (see Figure 3). The size of male and female lingcod in SA 13, 15 and 16 has also generally increased in 2004.

We used a heavier fishing leader to address concerns that large lingcod could not be landed on the light (7 kg) fishing leader used in previous surveys. Although the light leader did break more frequently than the heavy leader, the overall incidence of line breakage was relatively low and is therefore probably not a concern. Our gear calibration revealed that leader test did not affect catch rates for lingcod. Copper rockfish catch rates were also not affected by leader strength. However, quillback rockfish catch rates were significantly lower using the stronger leader. In this report, we had CPUE estimates available from light leader data to compare to previous surveys. Given there was very little improvement on line breakage and no change in CPUE for lingcod using the heavy leader, future surveys should use the light leaders for easier annual comparisons.

Different depth strata were sampled in 2004 than in previous surveys (0-25 and 26-50 m in 2004 compared to 5-40 m, 41-70 m, and 71-100 m in previous years). Depth strata were consistent with the 2003 survey of the Southern Strait of Georgia (Haggarty and King 2004) and the 1993 survey of SA 18 and 19 (Yamanaka and Murrie 1995). We re-classified the data from the 1980s using the modal depth (the depth at which most of the fishing occurred). This does, however, introduce bias into the study, since the range fished on some sets exceeds the range of the depth stratum into which they were re-classified. We found significant effects of depth on catch rates for many species including lingcod, copper rockfish and quillback rockfish. Therefore, depth strata with narrower ranges such as those used in this survey should be used to reduce one source of variability in catch rates and to strengthen temporal and spatial comparisons.

ACKNOWLEDGEMENTS

Thanks to K. Mathias, V. Hodes and P. Winchell for their hard work in the field and to C. Fort for the use of the Lifetimer. Thank you to M. Surry for help with the preparation of this report. Thank you to J. Lochead for reviewing this work.

REFERENCES

Analytical Software. 2000. Statistix. Version 7.

Haggarty, D.R., and King, J.R. 2004. Hook and line survey of Lingcod (*Ophiodon elongatus*) and Rockfish (*Sebastes sp.*) stocks in southern Strait of Georgia (statistical areas 17, 18 and 19) October 2003. Can. Tech. Rep. Fish. Aquat. Sci. 2533: 38p.

King, J.R. 2001. Assessment of Lingcod in the Strait of Georgia. Can. Sci. Ad. Sec. Res. Doc. 2001/132: 41 p.

King, J.R., and Surry, A.M. 2000. Lingcod stock assessment and recommended yield options for 2001. Can. St. Assess. Sec. Res. Doc. 2000/164: 50 p.

King, J.R., McFarlane, G.A., and Surry, A.M. 2003. Stock assessment framework for Strait of Georgia lingcod. Can. Sci. Ad. Sec. Res. Doc., 2003/04.

Richards, L.J., and Cass, A.J. 1985. 1985 Research catch and effort data on near shore reef-fishes in the Strait of Georgia B.C. (Statistical Areas 15 and 16). Can. Manuscr. Rep. Fish. Aquat. Sci. 1851: 68 p.

Richards, L.J., and Cass, A.J. 1987. 1986 Research catch and effort data on nearshore reef-fishes in British Columbia Statistical Areas 12, 13 and 16. Can. Manuscr. Rep. Fish. Aquat. Sci. 1903: 119 p.

Richards, L.J., Cass, A.J., Selsby, J.R., van den Broek, R., and Loynachan, S.D. 1985. A summary of research catch and effort data for near shore reef-fishes collected during 1984 in MSA 15 and 16 of the Strait of Georgia. Can. Manuscr. Rep. Fish. Aquat. Sci. 1833: 69 p.

Richards, L.J., and Hand, C.M. 1987. 1987 Research catch and effort data on nearshore reef-fishes in British Columbia Statistical Areas 12 and 13 . Can. Manuscr. Rep. Fish. Aquat. Sci. 1958: 59 p.

Richards, L.J., and Hand, C.M. 1989. Lingcod. pp. 35-61. *In* Groundfish Stock Assessment for the West Coast of Canada in 1988 and Recommended Yield Options for 1989. J. Fargo and A.V. Tyler [eds.]. Can. Tech. Rep. Fish. Aquat. Sci. 1646: 294 p.

Richards, L.J., and Schnute, J.T. 1986. An experimental and statistical approach to the question: is CPUE an index of abundance? Can. J. Fish. Aquat. Sci. 43: 1214-1227.

Yamanaka, K.L., and Murie, D.J. 1995. Hook and line surveys. pp. 69-76. *In* Groundfish Stock Assessments for the West Coast of Canada in 1994 and Recommended Yield Options for 1995. M. Stocker and J. Fargo [eds.]. Can. Tech. Rep. Fish. Aquat. Sci. 2069: 440 p.

Yamanaka, K.L., and Lacko, L.C. 2001, Inshore Rockfish (*Sebastes ruberrimus, S. maliger, S. caurinus, S. melanops, S. nigrocinctus, and S. nebulosus*) stock assessment for the West Coast of Canada and recommendations for management. Can. Sci. Advisory Secretariat Res. Doc. 2001/139.

Table 1. Descriptive statistics for lingcod Catch Per Unit of Effort (LCPUE) (fish/hour) and Total fish CPUE (TCPUE) for each fisher, June 14-July 9, 2004. We found no significant difference among fisher for either index using a Kruskal-Wallis test.

	LCPUE				TCPUE			
Fisher	F1	F2	F3	F4	F1	F2	F3	F4
N	68.0	67.0	69.0	75.0	68.0	67.0	69.0	75.0
Mean	8.5	9.0	7.0	7.5	14.6	15.0	13.2	14.7
SD	10.1	29.9	10.9	8.9	15.8	32.2	15.6	11.9
C.V.	119	331	156	119	108	215	118	81
Median	5.7	0.0	3.0	5.2	10.5	7.5	8.0	10.7
Range	0–48	0–240	0–60	0–48	0–78	0–240	0–84	0–60
	(Difference among fishers: H=1.85, p=0.1379, df=3)				(Difference among fishers: H=6.48, p=0.0903, df=3			

Table 2. Descriptive statistics for CPUE indices for lingcod (LCPUE), total fishes (TCPUE), copper rockfish (CCPUE) and quillback rockfish (QCPUE) caught on light (7 kg) and heavy (11 kg) leaders in Statistical Area 15 and 16, June 14-July 9, 2004. A Wilcoxon Signed Rank test showed that significantly more quillback rockfish and total fishes were caught on the light leader. Significant differences are shown in bold print.

	LCPUE		TCPUE		CCPUE		QCPUE	
Leader	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
N	38	38	38	38	38	38	38	38
Mean	8.3	6.4	14.6	10.9	2.1	1.8	2.5	0.9
SD	11.5	7.0	15.5	11.7	5.4	3.6	4.4	1.9
C.V.	139	111	107	107	256	201	177	201
Median	5.6	4.6	9.7	7.9	0.0	0.0	0.0	0.0
Range	0–60.0	0–34.3	0–84.0	0–53.9	0–24.0	0–17.6	0–18.0	0–7.9
	Difference in catch rates between light and heavy leader:							
	W=1.195, p=0.232		W=2.097, **p=0.036**		W=0.063, p=0.950		W=2.146, **p=0.032**	

Table 3. Descriptive statistics for Lingcod, Copper rockfish and Quillback CPUE (fish/hour) for each depth stratum over all areas and by statistical area, June 14-July 9, 2004. Shallow=0-25m, Deep=26-50m. Significant differences in catch rates between depth strata are shown in bold print.

	Shallow					Deep					
	N	Mean	SD	Med	Range	N	Mean	SD	Med	Range	Difference between depth strata:
Lingcod CPUE											
All areas	36	9.6	8.2	7.9	0–34.3	34	4.7	6.6	2.3	0–25.0	U=11.5, **p=0.0007**
Statistical Area											
13	10	16.2	7.5	15.7	6.7–33.2	9	9.1	8.1	9.7	0–23.4	U=3.2, p=0.0724
14	6	2.6	1.6	2.3	0–5.1	7	0.6	1.1	0.0	0–2.9	U=4.9, **p=0.0275**
15	18	6.8	6.1	6.4	0–25.0	9	8.1	3.4	7.8	3.4–12.7	U=3.0, p=0.0835
16	11	8.7	9.8	5.5	0–34.3	9	2.6	2.5	3.8	0–6.1	U=2.8, p=0.0920
17	5	3.0	2.0	2.9	1.2–5.9						
Difference among statistical areas:											
	H=20.7, **p=0.0004**, df=4					H=8.4, **p=0.0392**, df=3					
Copper CPUE											
All Areas	36	2.7	3.5	1.9	0–17.6	34	0.3	0.8	0	0-3.2	U=21.7, **p=>0.0001**
Statistical Area											
13	10	2.5	1.9	2.2	0–5.4	9	0.8	1.2	0.0	0–3.2	U=3.5, p=0.0620
14	6	1.3	0.8	1.5	0–2.1	7	0.3	0.5	0.0	0–1.1	U=4.1, **p=0.0425**
15	9	4.1	5.3	3.6	0–17.6	9	0.2	0.6	0.0	0–1.9	U=8.2, **p=0.0042**
16	11	2.6	3.7	1.8	0–9.8	9	0.0	0.0	0.0	0–0.0	U=6.4, **p=0.0114**
17	5	2.4	1.7	2.5	0–7.2						
Difference among statistical areas:											
	U=2.2, p=0.7004, df=4					U=4.4, p=0.2254, df=3					
Quillback CPUE											
All Areas	36	1.1	2.4	0	0–10.8	34	3.0	4.7	1.7	0–23.4	U=4.8, **p=0.0277**
Statistical Area											
13	10	2.4	3.7	0.8	0–10.8	9	7.4	6.9	4.1	1.7–23.4	U=5.7, **p=0.0169**
14	6	0.6	0.7	0.5	0–1.8	7	2.2	2.8	0.0	0–6.2	U=0.2, p=0.6413
15	9	0.4	0.8	0.0	0–2.0	9	1.1	1.7	0.0	0–3.9	U=0.5, p=0.4676
16	11	0.9	2.4	0.0	0–.9	9	1.3	2.2	0.0	0–5.4	U=0.6, p=0.4539
17	5	2.6	3.2	1.2	0–7.2						
Difference among statistical areas:											
	U=4.5, p=0.3472, df=4					U=10.4, **p=0.0156**, df=3					

Table 4. Inter-annual comparison of lingcod CPUE (fish/hour) by statistical area and depth stratum. Shallow =0-25m, Deep=26-50m. Significant differences are shown in bold print. Lingcod catch rates increased in 2004 in both depth strata in all areas except Statistical Area 16.

	Shallow					Deep				
	N	Mean	SD	Med	Range	N	Mean	SD	Med	Range
Area 13										
1986	20	10.6	8.9	11.0	0–34.2	11	7.8	5.8	8.6	0–17.1
1987	20	1.7	1.8	1.7	0–5.2	8	8.4	11.0	4.8	0–30.0
1988	24	3.9	4.6	2.2	0–13.0	24	2.4	3.0	1.6	0–12.0
2004	10	16.2	7.5	15.7	6.7–33.2	9	9.1	8.0	9.7	0–23.4
Difference among years:										
	H=27.9, **p=<0.0001**, df=3					H=9.0, **p=0.0287**, df=3				
Area 15										
1985	28	2.8	5.7	0	0–27.7	8	0	0	0	0–0
2004	9	8.1	3.3	7.8	3.4–12.7	9	5.5	8.0	3.8	0–25.0
Difference among years:										
	U=12.5, **p=0.0004**, df=1					U=5.7, **p=0.0169**, df=1				
Area 16										
1985	29	3.6	4.5	3.3	0–16.4	19	1.2	1.9	0	0–4.6
1986	39	5.2	5.6	4.0	0–23.1	24	1.3	2.5	0	0–8.0
2004	11	8.7	9.8	5.5	0–34.3	9	2.6	2.5	3.8	0–6.1
Difference among years:										
	H=4.4, p=0.1136, df=2					H=2.6, p=0.2751, df=2				

Table 5. Inter-annual comparison of copper and quillback rockfish catch rates (CPUE fish/hour) by statistical area and depth stratum. Shallow=0-25m, Deep=26-50m. Significant differences are shown in bold print.

	Shallow					Deep				
	N	Mean	SD	Med	Range	N	Mean	SD	Med	Range
Copper CPUE										
Area 13										
1986	20	25.1	27.3	21.5	0–108.0	11	9.1	19.7	0	0–60.0
1987	20	4.8	5.0	4.3	0–23.3	8	5.8	7.4	1.2	0–16.0
1988	24	7.7	8.5	5.1	0–34.3	24	2.4	5.2	0	0–20.1
2004	10	2.5	1.9	2.2	0–5.4	9	0.8	1.2	0	0–3.2
Difference among years:										
	H=15.1 **p=0.0018**, df=3						H=1.5, p=0.6843, df=3			
Area 15										
1985	28	9.5	9.3	7.8	0–30.0	8	0	0	0	0–0
2004	9	4.1	5.3	3.6	0–17.6	9	0.2	0.6	0	0–1.9
Difference among years:										
	U=2.0 p=0.1526, df=1						U=0.9, p=0.3458, df=1			
Area 16										
1985	29	5.4	8.9	0	0–32.0	19	0.3	1.3	0	0–5.7
1986	39	7.8	8.4	5.5	0–32.7	24	0.2	0.9	0	0–4.6
2004	11	2.6	3.7	1.8	0–9.8	9	0	0	0	0–0
Difference among years:										
	H=3.1 p=0.2133, df=2						H=0.5, p=0.7895, df=2			
Quillback CPUE										
Area 13										
1986	20	31.3	19.1	30	0–72.0	11	29.6	18.4	25.7	0–60.0
1987	20	7.6	8.1	4.7	0–31.8	8	14.5	10.5	9.3	0–30.0
1988	24	13.8	12.3	10.7	0–12.9	24	20.2	14.9	16.1	1.9–66.7
2004	10	2.4	3.7	0.8	0–10.8	9	7.4	6.9	4.1	1.7–23.4
Difference among years:										
	H=30.6 **p=<0.0001**, df=3						H=12.7, p=0.0052, df=3			
Area 15										
1985	28	1.9	3.5	0	0–13.9	8	8.8	9.3	7.6	0–24.0
2004	9	0.4	0.8	0	0–2.0	9	1.1	1.7	0	0–3.9
2004*	9	0.6	1.2	0	0–2.9	9	1.6	2.6	0	0–5.8
Difference among years:										
	U=0.9 p=0.3463, df=1 (*U=0.89, p=0.3463)						U=3.5, p=0.0607, df=1 (*U=3.5, p=0.0607)			
Area 16										
1985	29	4.8	8.3	0	0–34.3	19	5.2	13.7	0	0–60.0
1986	39	9.4	11.1	7.1	0–54.0	24	7.3	10.1	3.9	0–35.0
2004	11	0.9	2.4	0	0–7.9	9	1.3	2.2	0	0–5.4
2004*	11	1.3	3.6	0	0–11.9	9	2.0	3.3	0	0–8.1
Difference among years:										
	H=13.3, **p=0.0013**, df=2 (*H=12.6, **p=0.0018**)						H=4.7, p=0.0952, df=2 (*H=3.8, p=0.1493)			

*2004 QCPUE using light (7 kg) leader.

Table 6. Length of male and female lingcod, captured June 14-July 9, 2004, by depth stratum and Statistical Area. Significant differences are shown in bold print. Female lingcod were longer than male lingcod and longer lingcod of both sexes were found in deeper water. The only significant difference in lingcod length among statistical areas was in the shallow depth stratum of SA 13 where male lingcod were longer than those in SA 15 and 16.

	Male					Female				
	N	Mean	SD	Med	Range	N	Mean	SD	Med	Range
All	193	499.0	71.8	488.0	296–758	150	583.6	112.9	560.0	339–960
Difference in length between sexes: U=56.2, **p=<0.0001**, df=1										
Shallow	143	487.9	63.8	481.0	296–672	100	560.2	105.4	542.0	339–931
Deep	50	530.6	84.0	533.5	296–758	49	628.7	114.5	621.0	454–960
Difference in length between depth stratum:										
	U=12.2, **p=0.0005**, df=1						U=12.9, **p=0.0003**, df=1			
Shallow										
Area 13	36	589.9	137.2	579.5	405–931	64	481.9	64.3	480.0	325–672
Area 15	32	543.9	74.0	526.0	424–791	27	467.5	50.1	470.0	313–590
Area 16	28	548.5	72.5	542.0	425–685	36	504.4	54.6	502	405–628
Difference among statistical areas:										
	H=7.5, **p=0.0234**, df=2						H=2.0, p=0.3748, df=2			
Deep										
Area 13	19	679.3	130.4	683.0	464–960	25	543.6	91.7	553.0	296–758
Area 15	21	616.3	88.3	624.0	500–900	14	544.8	79.4	546.0	419–647
Area 16	6	561.2	102.2	555.0	454–718	10	483.3	57.7	479.5	358–576
Difference among statistical areas:										
	H=4.7, p=0.0972, df=2						H=5.5, p=0.0634, df=2			

Table 7. Length of male and female lingcod caught in each sampling year by statistical area. Depth strata were pooled. Significant differences are shown in bold print.

	Male					Female				
	N	Mean	SD	Med	Range	N	Mean	SD	Med	Range
Area 13										
1986	31	444.4	83.5	455.0	284–644	20	465.2	111.1	492.5	305–666
1987	37	446.5	60.0	435.0	345–600	–	–	–	–	–
1988	44	425.0	102.4	428.5	304–664	19	447.5	92.2	469.0	334–580
2004	89	499.2	77.7	492.0	296–758	55	620.8	140.4	625.0	405–960
Difference among years:										
	H=23.8, **p=<0.0001**, df=3						H=29.5, **p=<0.0001**, df=2			
Area 15										
1985	13	426.5	422.0	499.0	372–499	4	510.0	116.1	463.5	432–681
2004	41	493.9	71.1	479.0	313–647	52	572.9	87.6	553.0	424–900
Difference among years:										
	U=8.9, **p=0.0028**, df=1						U=2.5, p=0.1116, df=1			
Area 16										
1985	19	462.5	63.4	458.0	350–595	15	495.6	50.2	504.0	420–565
1986	23	416.4	68.2	428.0	308–528	29	451.2	88.0	462.0	317–623
2004	46	499.8	55.4	494.5	358–628	34	550.7	76.9	542.0	425–718
Difference among years:										
	H=20.4, **p=<0.0001**, df=2						H=17.9, **p=0.0001**, df=2			

Table 8. Maturity classes of male and female lingcod, captured June 14-July 9, 2004. Most male lingcod were either maturing or resting while females were maturing, spent or resting. (See Appendix Table 4 for a description of maturity classes).

	Male		Female	
Maturity Class	Frequency	Percent %	Frequency	Percent %
1–Immature	36	19.1	33	22.1
2–Maturing-small	61	32.4	67	45.0
3–Maturing-large	3	1.6	6	4.0
4–Mature	0	0	0	0
5–Ripe	0	0	0	0
6–Spent	1	0.5	25	16.8
7–Resting	87	46.3	18	12.1
Total	188	100	149	100

Table 9. Summary of stomach content analysis of lingcod captured in the Strait of Georgia, June 14 – August 3, 2004.

Mean volume (cm^3)	15.4
SD of volume	51.7
Number of stomachs examined	337
Number empty or everted	213
Number with prey	123
Number with identifiable prey	118
% empty	63
% with prey	37
% with identifiable prey	96

Table 10. Prey items identified in stomach content analysis of lingcod captured in the Strait of Georgia, June 14 – August 3, 2004, where N is the number of occurrences of each prey type, %V is the proportion of total prey volume accounted for by each prey type, and %C is the average proportion of individual volume of stomach contents accounted for by each prey type.

Prey Description	N	Frequency of Occurrence (%)	Mean volume (cm^3)	SD of volume	%V	%C
Fish remains	89	75	12.5	37.0	52	89
Shrimp spp.	14	12	8.1	9.8	5	77
Octopus spp.	12	10	13.0	18.1	7	83
Pacific herring	7	6	12.3	13.2	4	86
Rockfish spp.	4	3	139.5	240.5	26	100
Pink shrimp	3	3	2.7	0.6	0	66
Pacific sand lance	2	2	7.0	1.4	1	50
Seaweed/algae	2	2	5.0	0.0	0	92
Eggs	1	1	1.0	--	0	4
Walleye pollock	1	1	1.0	--	0	8
Euphausiid (*E. pacifica*)	1	1	2.0	--	0	100
Mollusc spp.	1	1	1.0	--	0	4
Flatfish spp. (Pleuronectidae)	1	1	75.0	--	4	100
Invertebrate remains	1	1	1.0	--	0	100

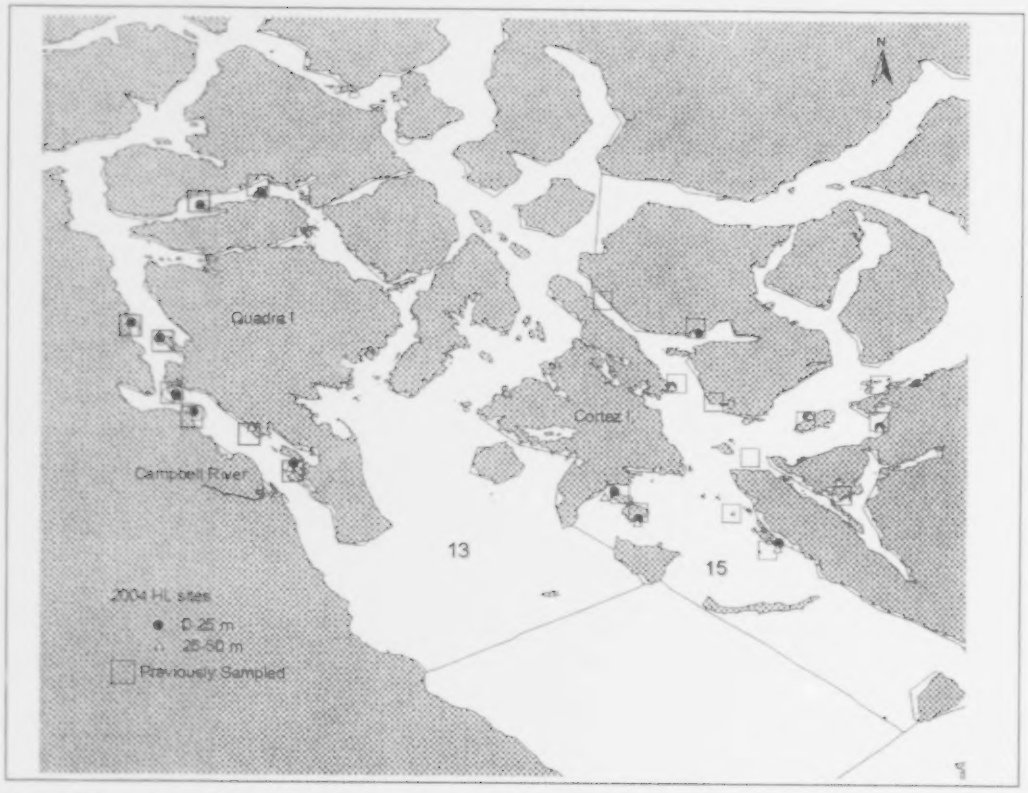

Figure 1. Locations of sites in Statistical Areas 13 and 15 of the Strait of Georgia sampled June 14-July 9, 2004. Previously sampled locations in are denoted by the 1 x 1 km jig blocks.

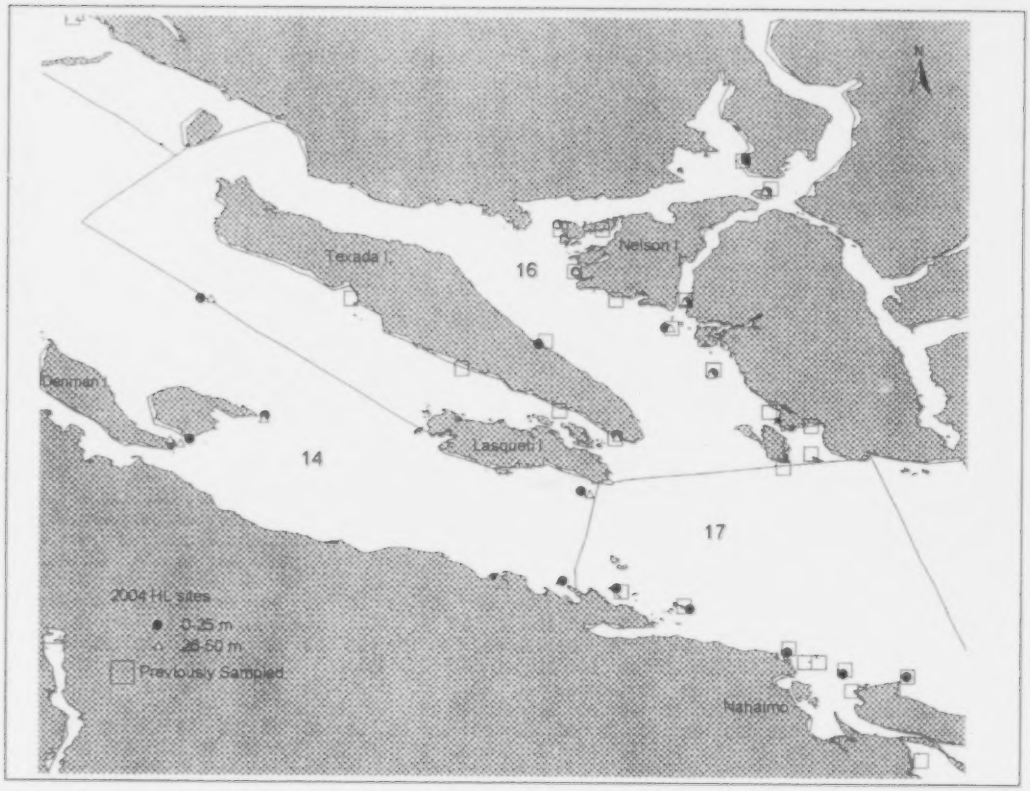

Figure 2. Locations of sites in Statistical Areas 14, 16 and 17 of the Strait of Georgia sampled June 14-July 9, 2004. Previously sampled locations are denoted by the 1 x 1 km jig blocks. No sites in SA 14 were previously sampled.

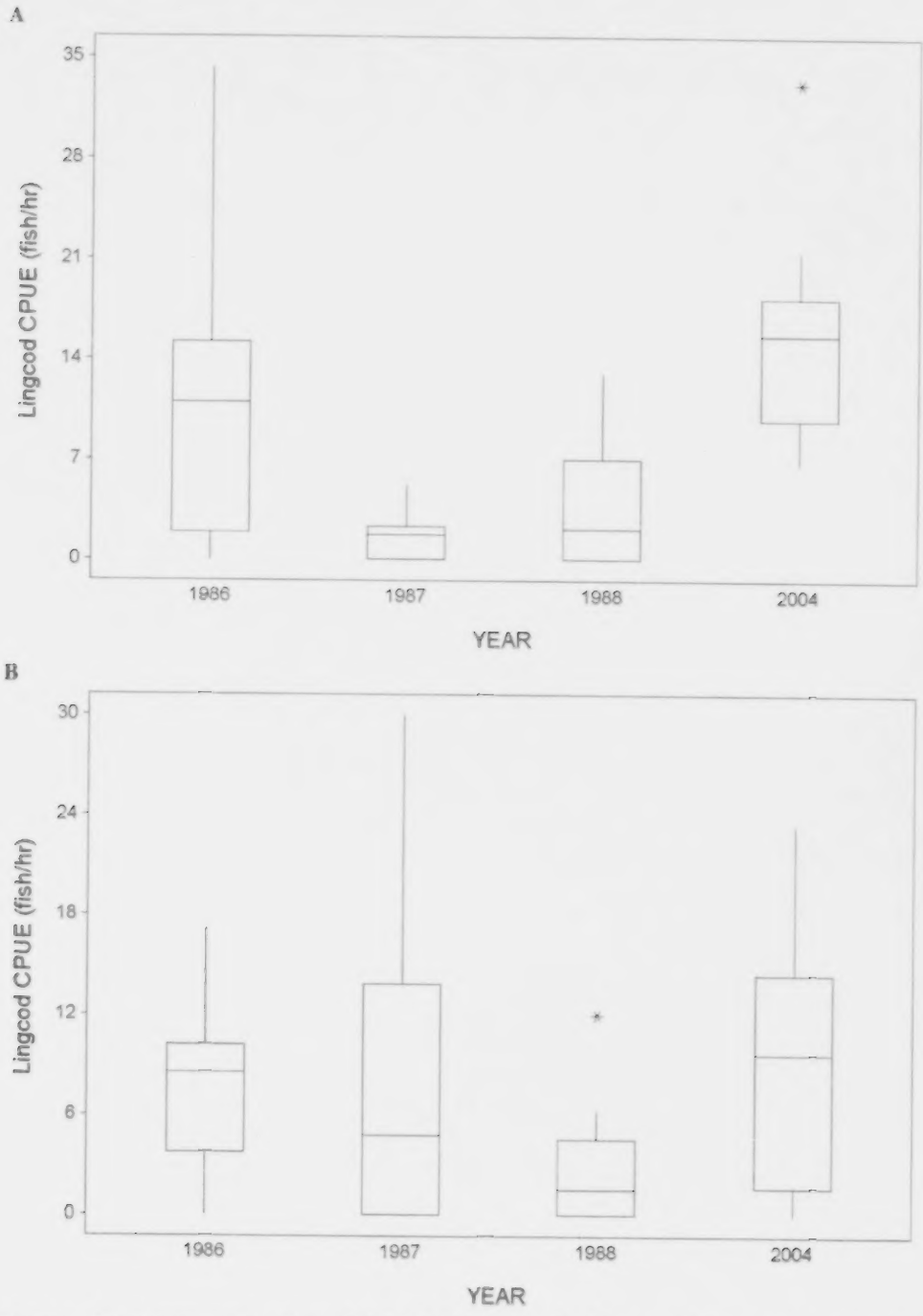

Figure 3. Boxplot representing lingcod CPUE (fish/hour) by depth stratum in Statistical Area 13, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median is indicated by the horizontal line in the box, while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers, while outliers are shown as * and °. 2004 catch rates are significantly greater than 1987 and 1988 but equal to 1986 in the shallow stratum. No pair-wise difference exists in the deep stratum.

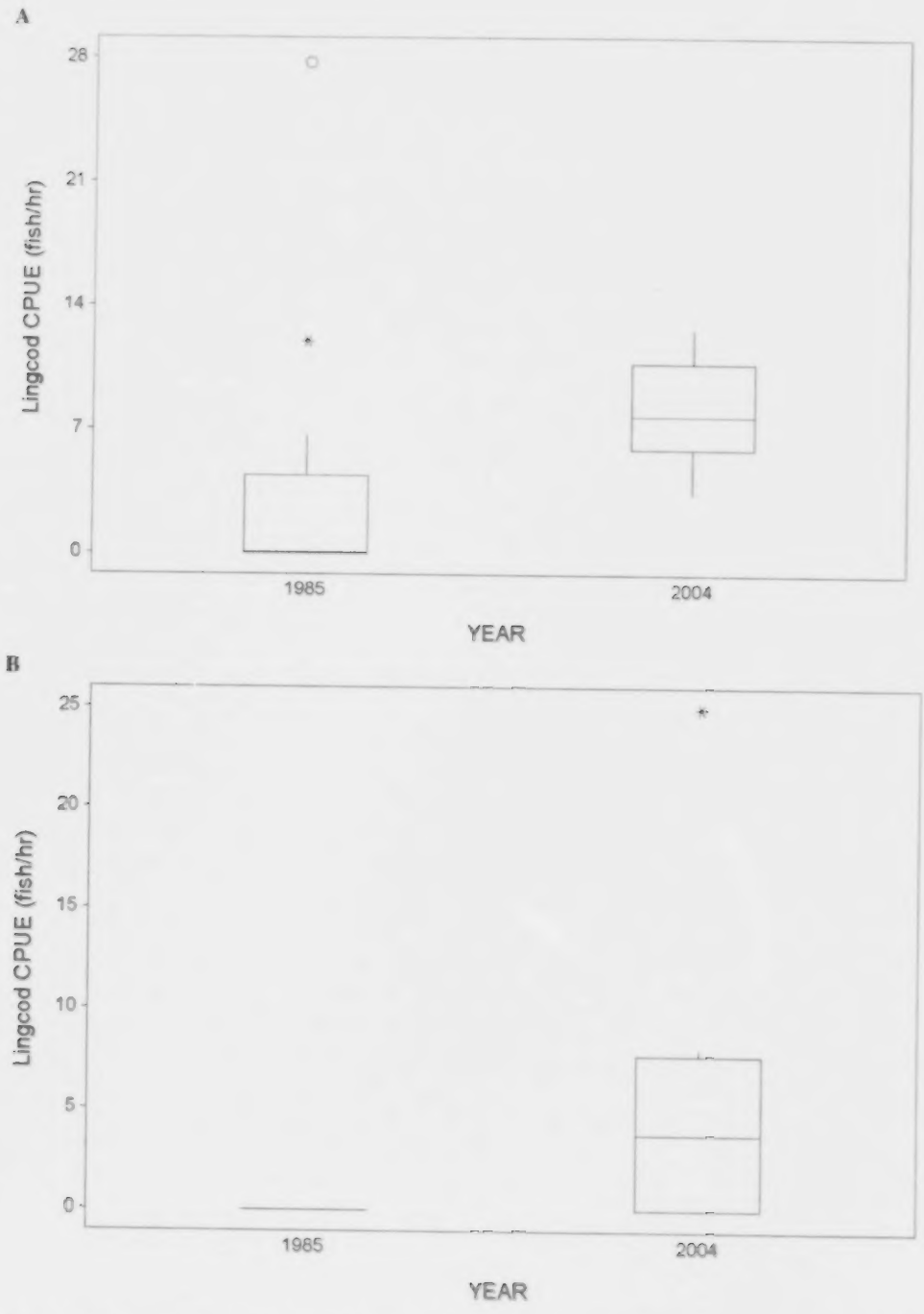

Figure 4. Boxplot representing lingcod CPUE (fish/hour) by depth stratum in Statistical Area 15, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median is indicated by the horizontal line in the box, while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers ,while outliers are shown as * and °. 2004 catch rates are significantly greater than 1985 rates in both depth strata.

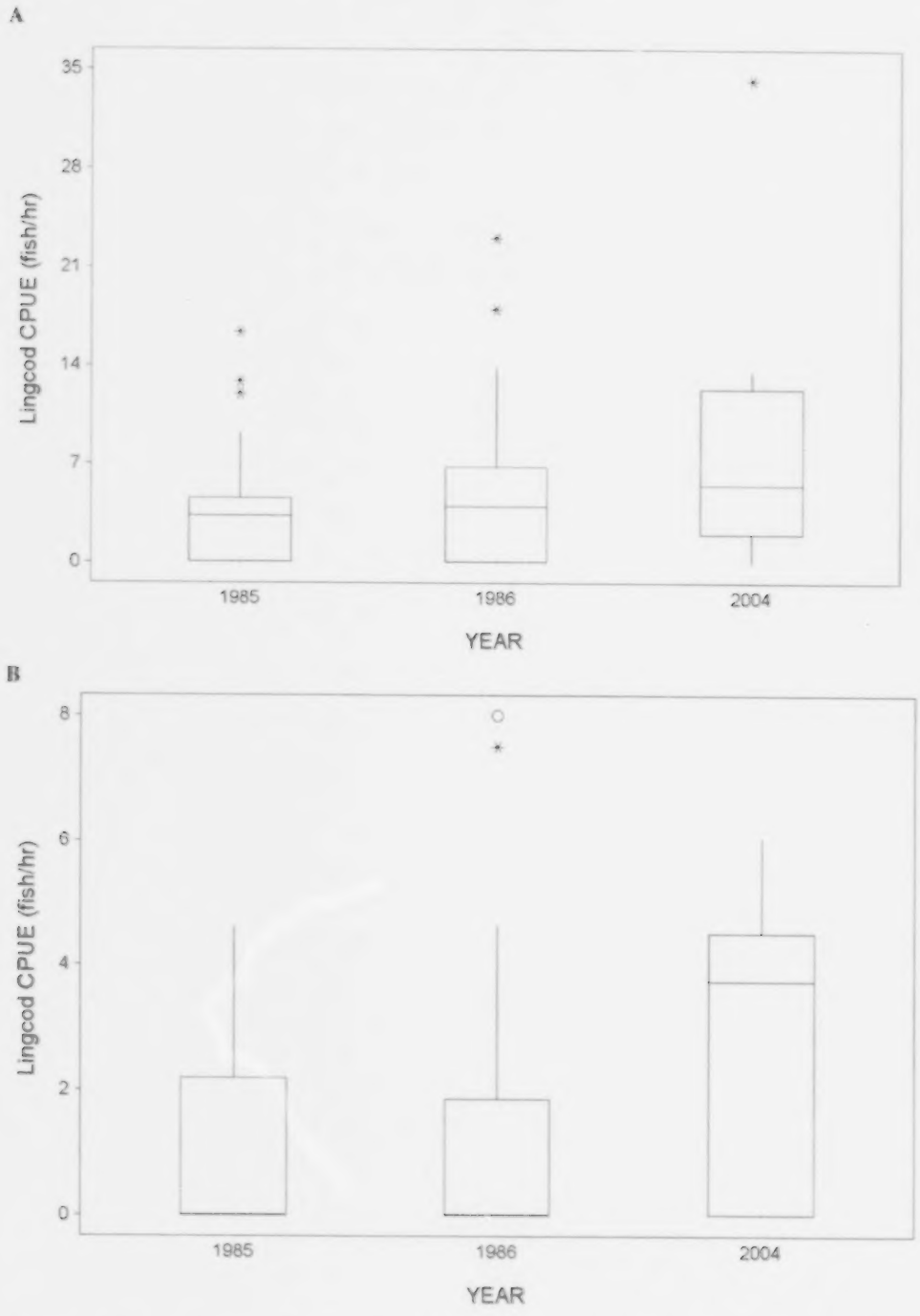

Figure 5. Boxplot representing lingcod CPUE (fish/hour) by depth stratum in Statistical Area 16, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median is indicated by the horizontal line in the box, while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers, while outliers are shown as * and °. No significant difference in catch rates exist.

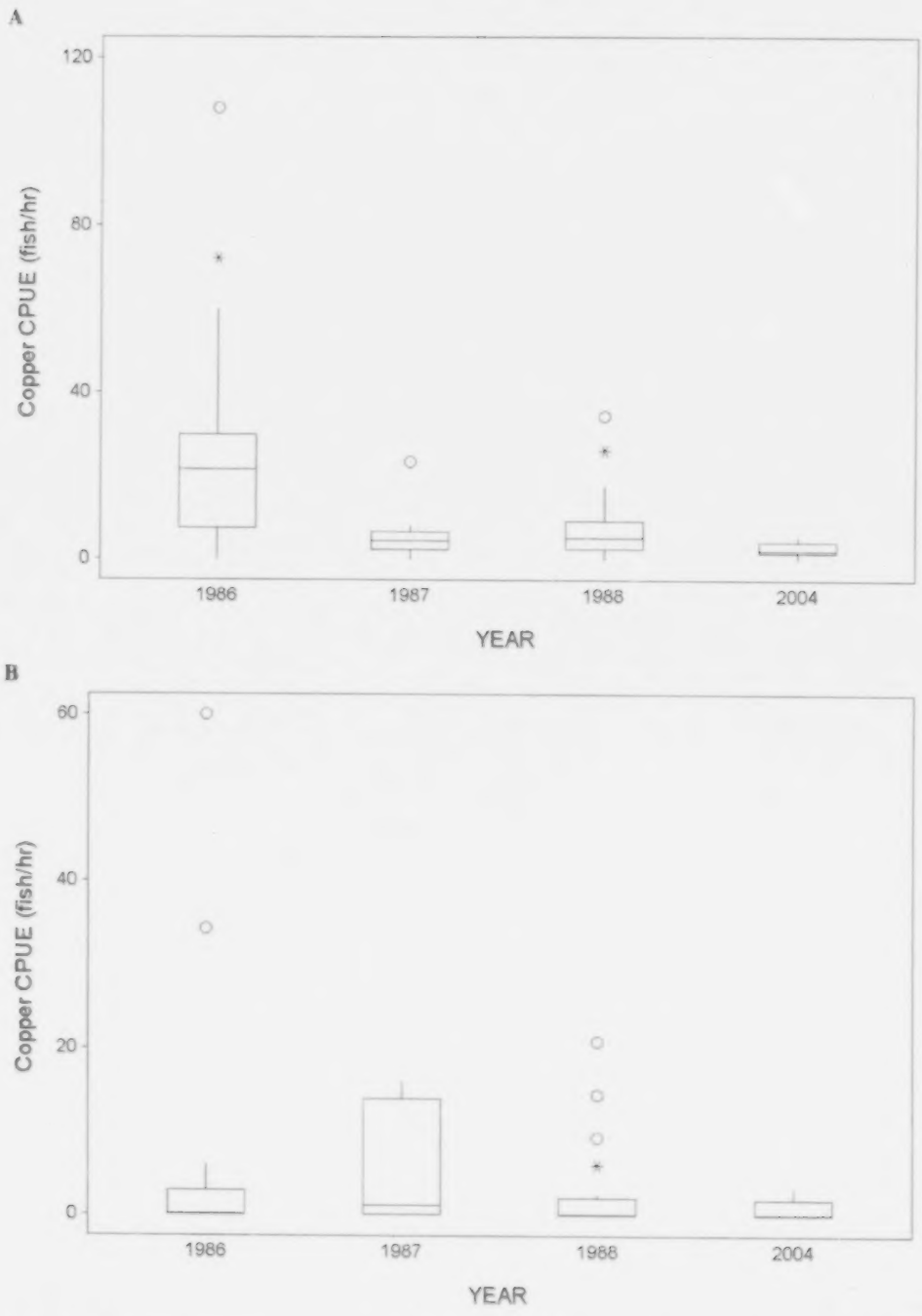

Figure 6. Boxplot representing copper rockfish CPUE (fish/hour) by depth stratum in Statistical Area 13, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median is indicated by the horizontal line in the box, while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers, while outliers are represented by * and °. 2004 and 1987 catch rates in the shallow stratum are significantly lower than 1986 and 1988. No differences exist in the deep stratum.

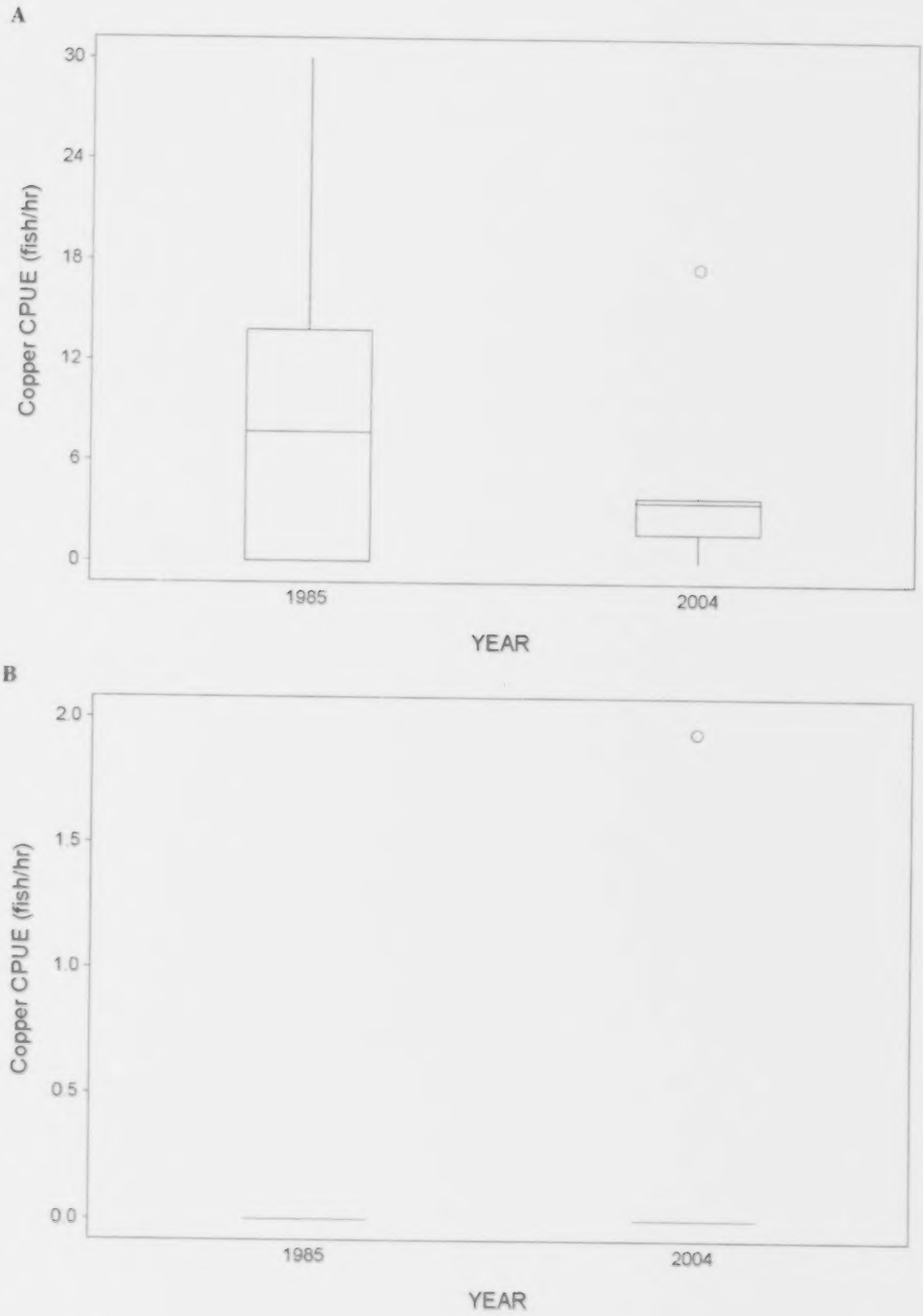

Figure 7. Boxplot representing copper rockfish CPUE (fish/hour) by depth stratum in Statistical Area 15, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median is indicated by the horizontal line in the box ,while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers, while outliers are represented by * and °. Catch rates are not significantly different.

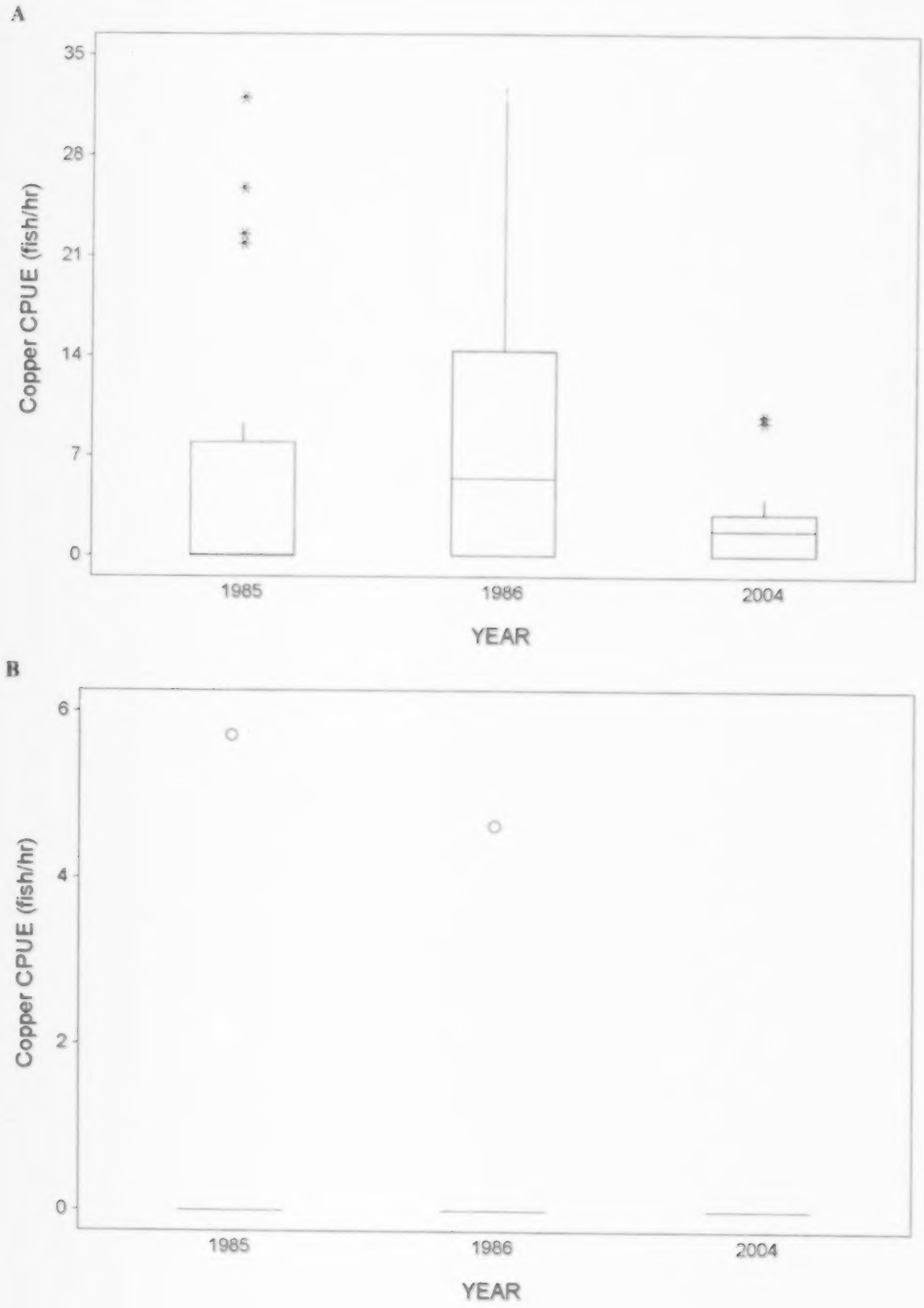

Figure 8. Boxplot representing copper rockfish CPUE (fish/hour) by depth stratum in Statistical Area 16, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median is indicated by the horizontal line in the box, while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers, while outliers are represented by * and °. Catch rates are not significantly different.

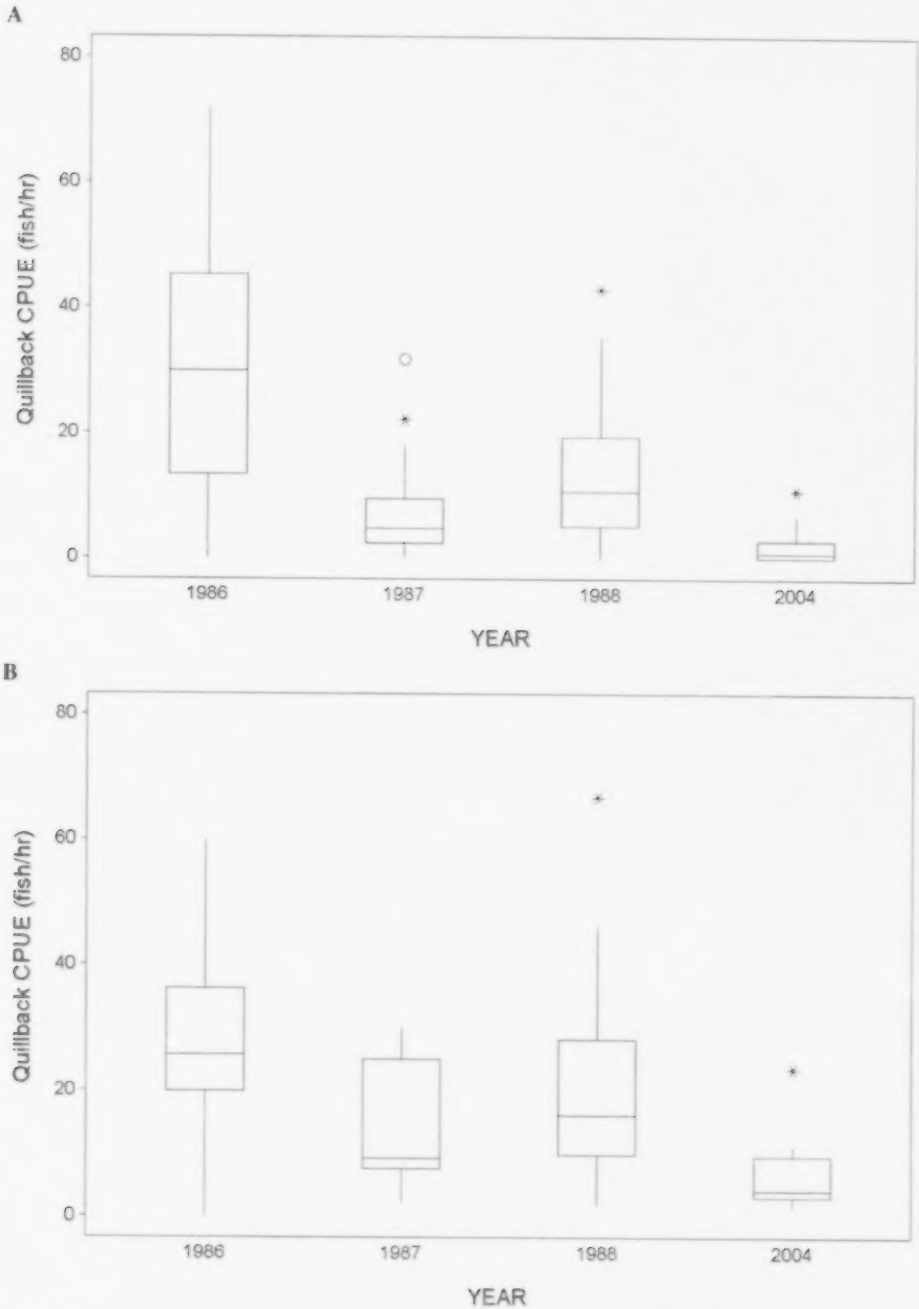

Figure 9. Boxplot representing the quillback rockfish catch per unit of effort (fish per hour) by depth stratum in Statistical Area 13, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median is indicated by the horizontal line in the box, while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers, while outliers are represented by * and °. Quillback catch rates in the shallow stratum decreased over time with three significantly different groups: 1986, 1987-1988, and 2004. The decreasing trend in the deep stratum is not significant.

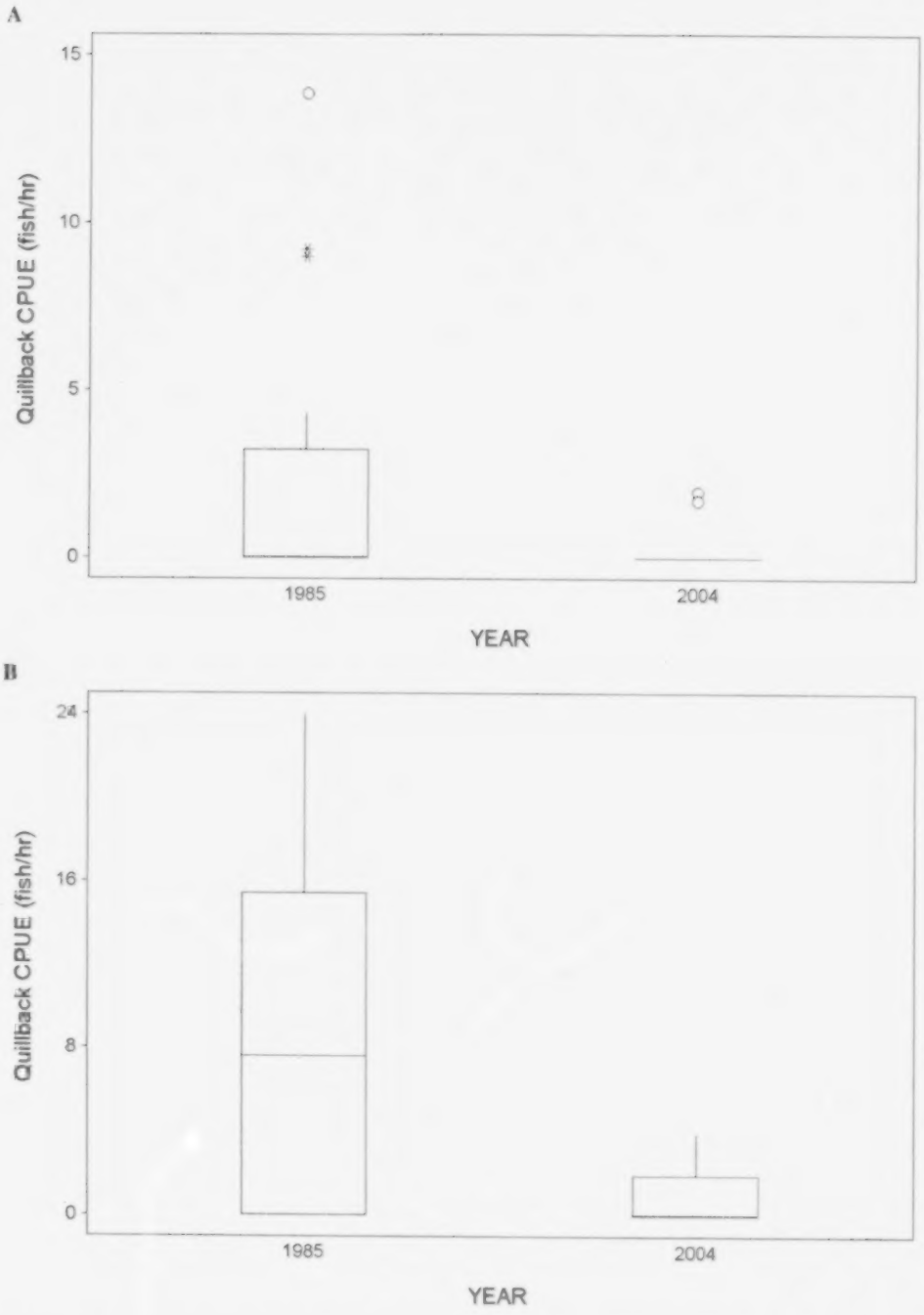

Figure 10. Boxplot representing the quillback rockfish catch per unit of effort (fish per hour) by depth stratum in Statistical Area 15, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median is indicated by the horizontal line in the box, while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers, while outliers are represented by * and °. Quillback catch rates are not significantly different although 2004 deep catch rates tend to be lower.

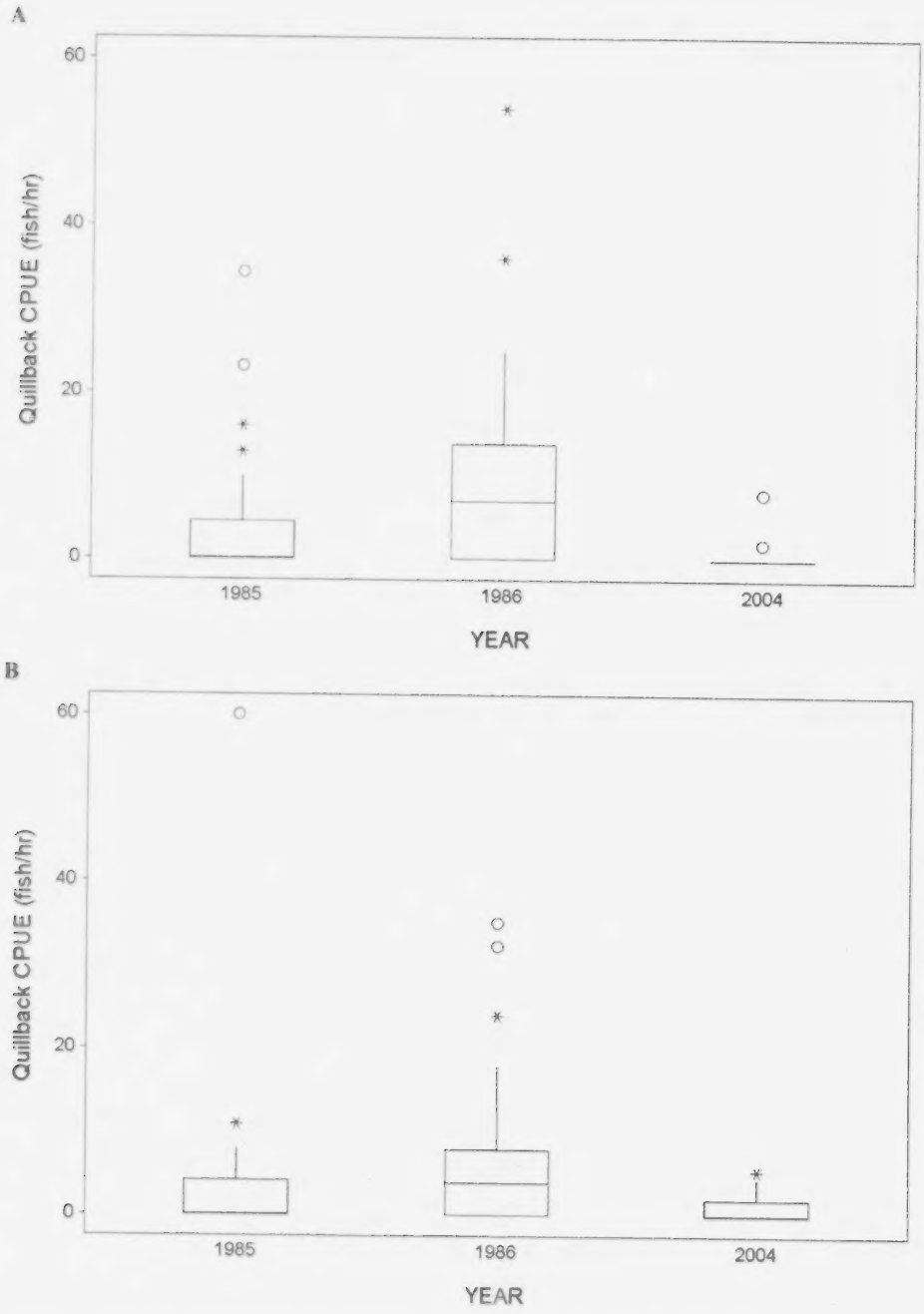

Figure 11. Boxplot representing the quillback rockfish catch per unit of effort (fish per hour) by depth stratum in Statistical Area 16, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median is indicated by the horizontal line in the box, while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers, while outliers are represented by * and °. Quillback catch rates were significantly lower in 2004 in the shallow stratum and tended to be lower, but were not significant in the deep stratum.

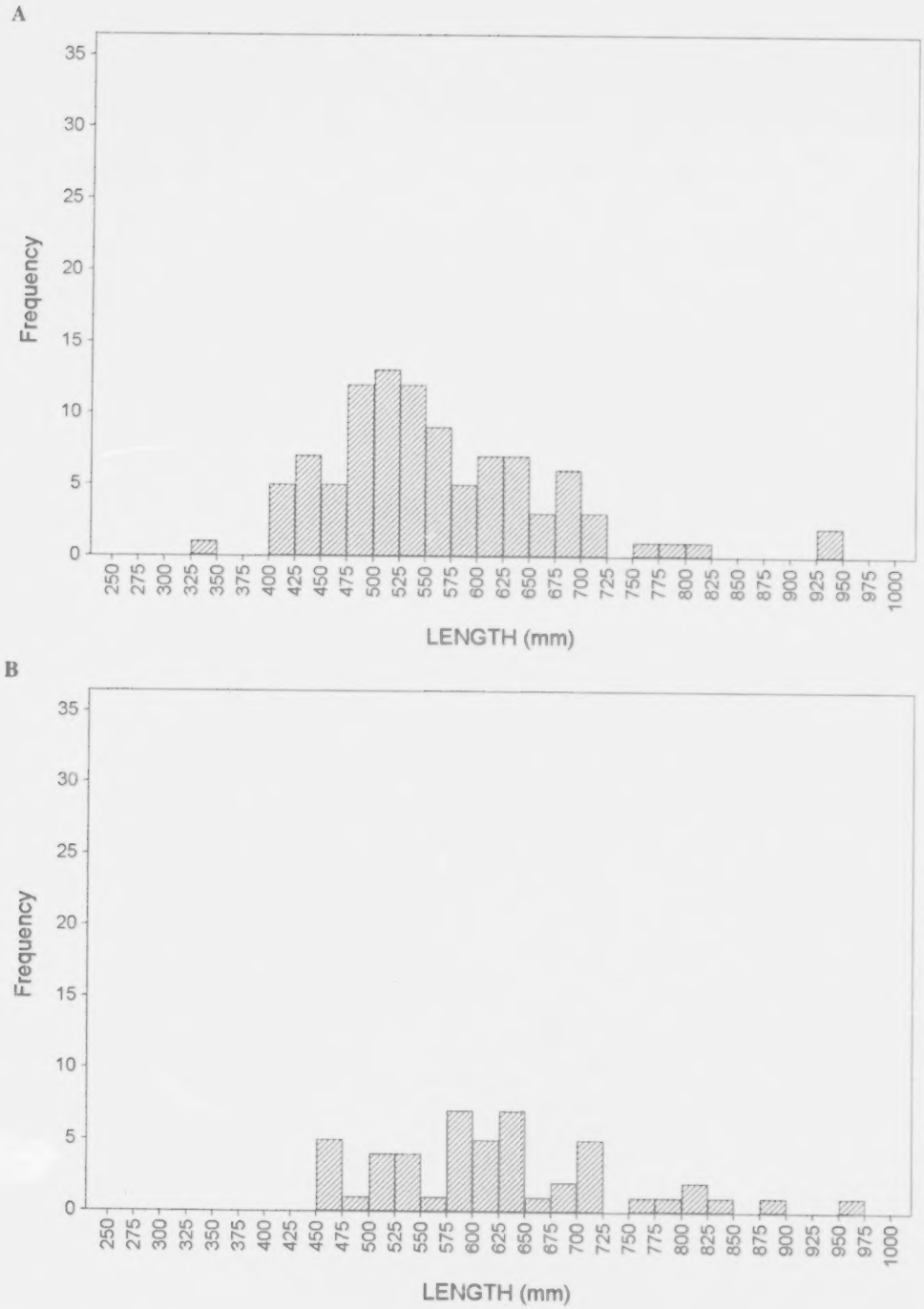

Figure 12. Length frequency histogram for female lingcod caught in the Hook and Line Survey in Statistical Areas 13-17, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m).

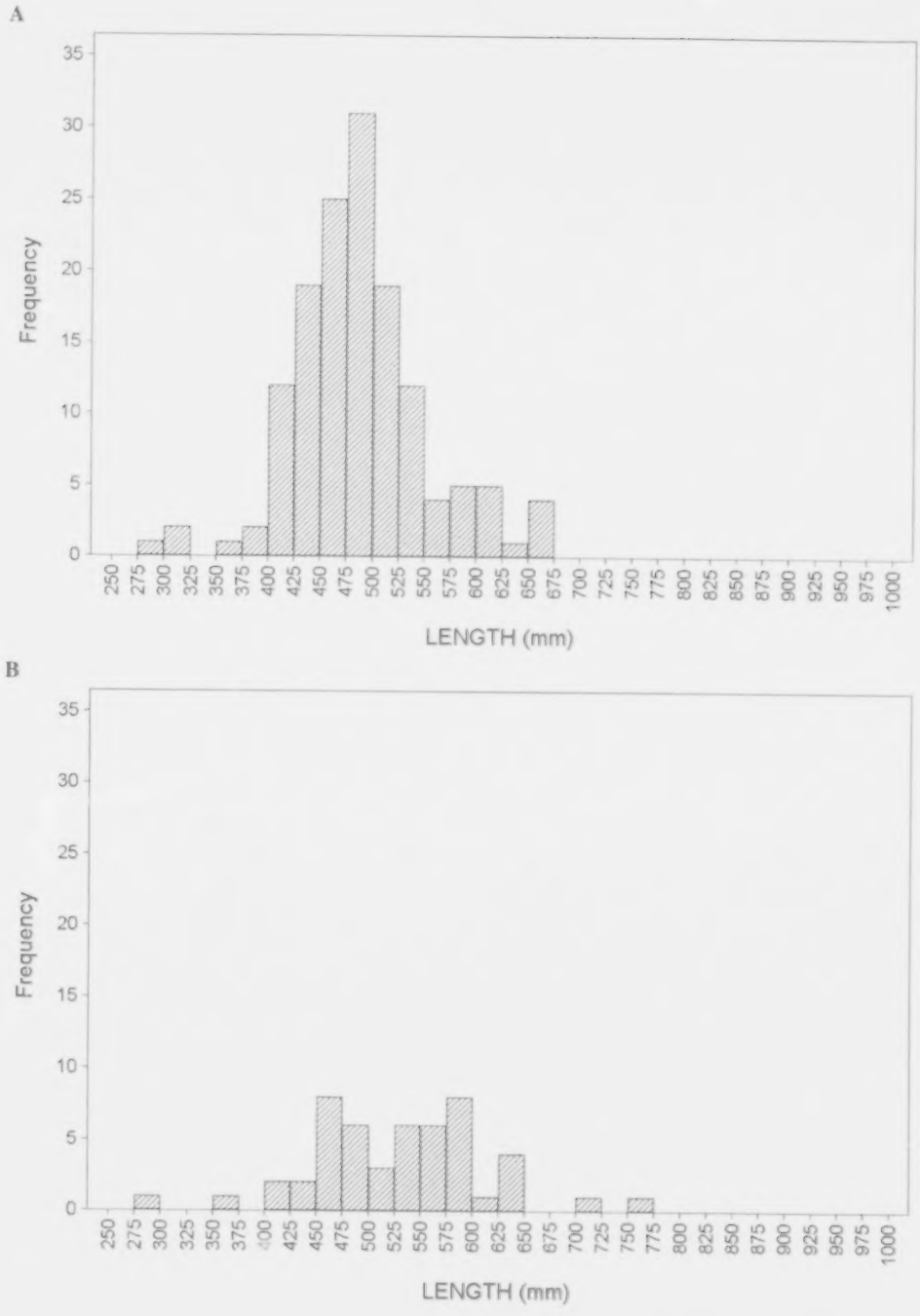

Figure 13. Length frequency histogram for male lingcod caught in the Hook and Line Survey in Statistical Areas 13-17, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m).

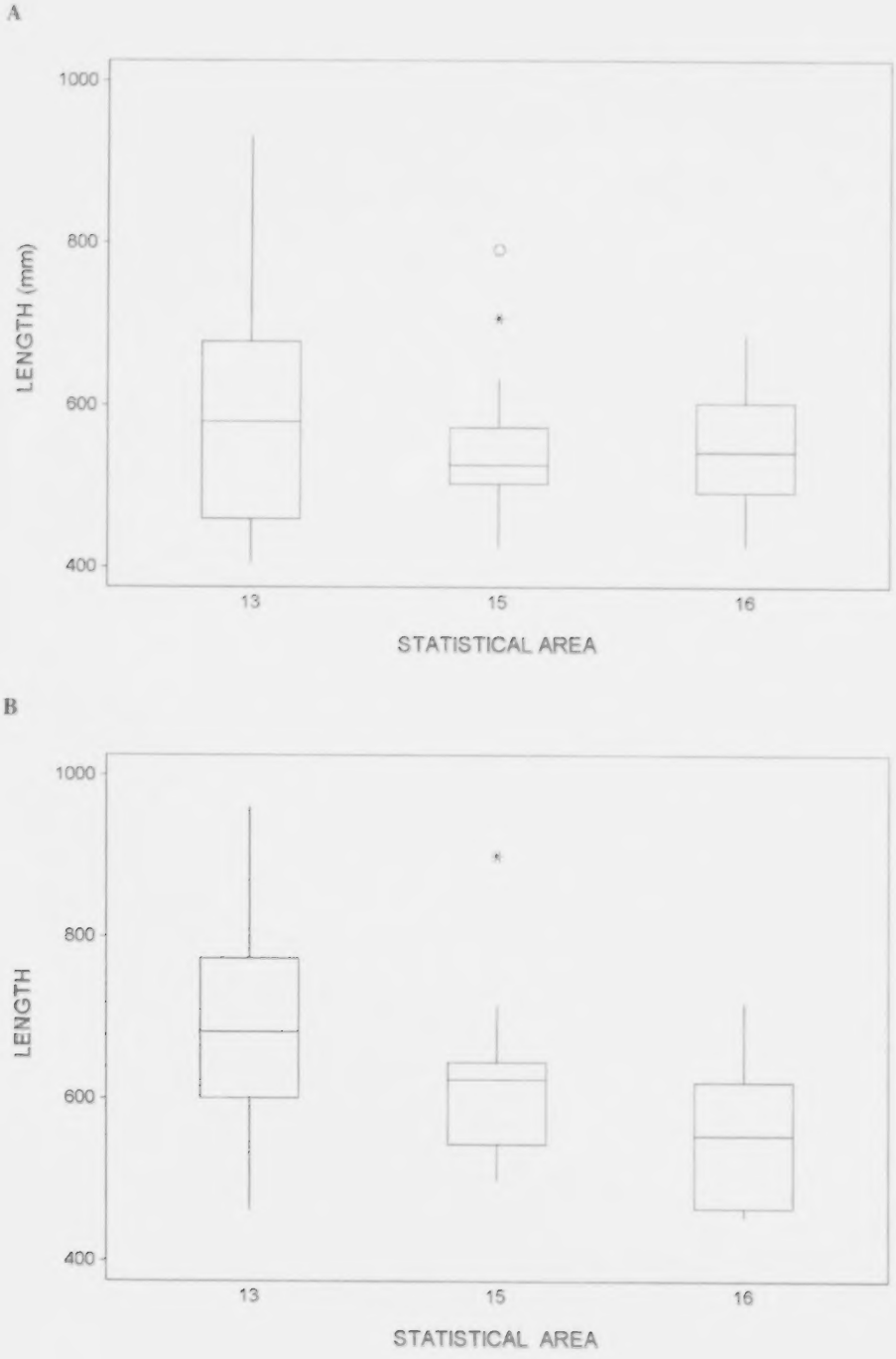

Figure 14. Boxplot representing the female lingcod length by statistical area, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median length is indicated by the horizontal line in the box while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers while outliers are represented by * and °. No significant differences exist.

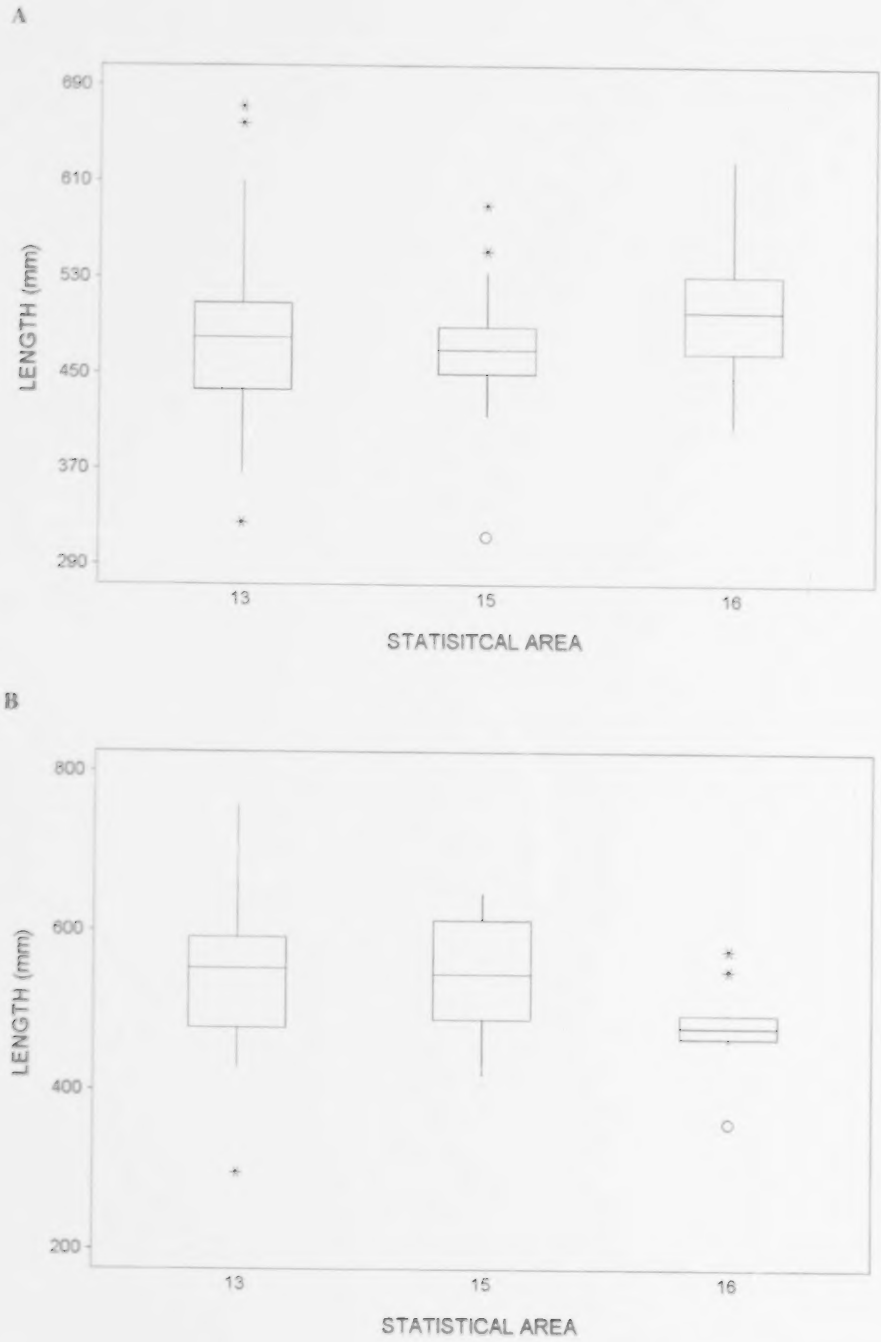

Figure 15. Boxplot representing the male lingcod length by statistical area, June 14-July 9, 2004. A=Shallow (0-25m), B=Deep (26-50 m). The median length is indicated by the horizontal line in the box while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers while outliers are represented by * and °. Male lingcod caught in the shallow stratum in area 15 were smaller than the other two areas. No significant differences exists in the deep stratum.

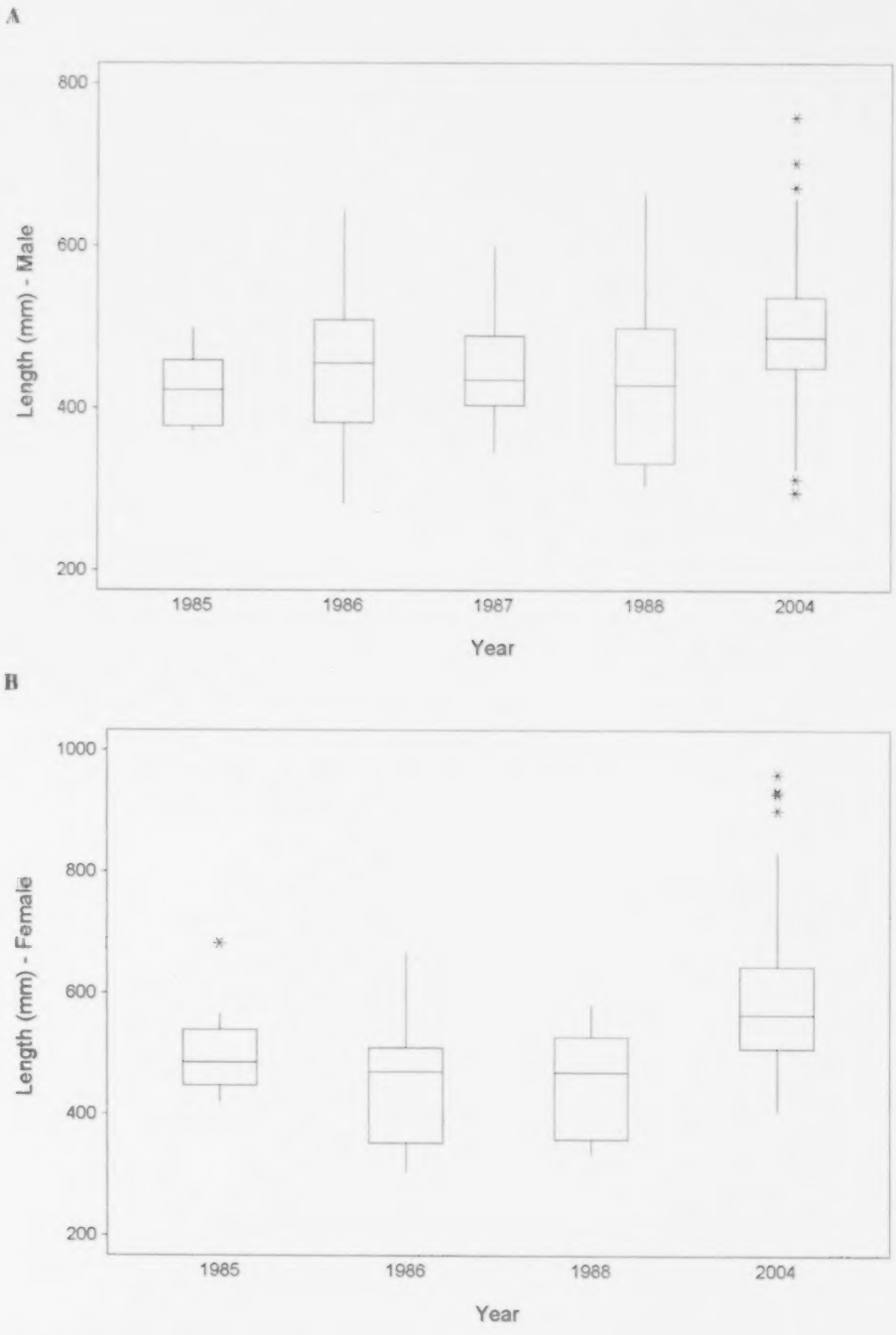

Figure 16. Boxplot representing A) male and B) female lingcod length by year. The median length is indicated by the horizontal line in the box while box edges depict the 1st and 3rd quartiles. The typical range of the data are represented by the whiskers while outliers are represented by * and °. The length of both male and female lingcod caught in hook and line surveys tends to be increasing. Only one female lingcod was captured in 1987.

Appendix Table 1. Location, depth, time, and environmental characteristics for each fishing set for the 2004 hook and line survey of lingcod and rockfish in the Strait of Georgia, June 14 – July 8, 2004. SA = Statistical Area. Depth stratum 1 = 0-25 m (shallow); depth stratum 2 = 26-50 m (deep). Bottom depth is the modal bottom depth over the duration of the set. See Appendix Table 8 for sea state, tide, current, and weather codes.

Set	Date	Site No.	Site name	SA	Depth Stratum	Latitude	Longitude	Bottom Depth (m)	Start Time	Finish Time	Sea State	Tide	Current	Weather
1	June 14	1405	Flora It.	14	1	49°31.04'	124°34.50'	22	11:45	12:46	3	2	1	1
2	June 14	1405	Flora It.	14	2	49°30.87'	124°34.63'	48	12:50	13:58	4	2	1	1
3	June 15	1406	Exeter Shoal	14	2	49°39.72'	124°38.72'	37	10:35	12:10	2	1	1	1
4	June 15	1406	Exeter Shoal	14	1	49°39.63'	124°39.32'	22	12:20	14:00	1	4	1	1
5	June 15	1405	Flora It.	14	2	49°30.65'	124°34.12'	40	14:30	16:23	2	2	1	1
6	June 16	1404	Norman Pt.	14	1	49°29.32'	124°39.90'	22	9:55	10:55	2	1	1	1
7	June 16	1404	Norman Pt.	14	2	49°29.46'	124°40.61'	43	10:57	12:00	2	1	1	1
8	June 16	1403	Boyle Pt.	14	1	49°28.98'	124°41.23'	6	12:45	13:55	2	4	0	1
9	June 16	1403	Boyle Pt.	14	2	49°29.29'	124°41.32'	46	14:00	15:06	1	2	1	1
10	June 19	1402	Sangster I.	14	1	49°25.71'	124°11.85'	11	10:10	11:11	3	1	1	1
11	June 17	1402	Sangster I.	14	2	49°25.52'	124°11.22'	38	11:20	12:30	3	1	1	1
12	June 17	1401	Mistaken I.	14	2	49°19.28'	124°13.25'	40	13:20	14:30	3	2	1	1
13	June 17	1401	Mistaken I.	14	1	49°19.23'	124°13.14'	11	14:30	15:35	3	2	1	1
14	June 18	304	Entrance I.	17	1	49°12.51'	123°48.50'	15	9:25	10:15	4	1	1	4
15	June 18	306	Snake I.	17	1	49°12.67'	123°53.05'	13	10:35	11:29	4	1	1	1
16	June 18	309	Neck Pt.	17	1	49°14.21'	123°57.02'	12	11:40	12:38	4	4	1	1
17	June 18	310	Grey Rock	17	1	49°17.28'	124°4.02'	12	13:00	14:00	3	4	1	1
18	June 18	311	Douglas I.	17	1	49°18.74'	124°9.25'	14	14:19	15:06	2	2	1	1
19	June 21	1307	Copper Cliffs	13	1	50°5.98'	125°16.31'	19	10:00	11:45	1	1	3	1
20	June 21	1307	Copper Cliffs	13	2	50°5.96'	125°16.35'	37	11:45	12:30	2	1	3	1
21	June 21	1306	Race Pt.	13	2	50°6.89'	125°19.60'	38	12:40	14:13	0	1	4	1
22	June 21	1303	Deepwater Bay	13	2	50°10.84'	125°21.27'	38	14:35	15:45	2	4	1	1
23	June 22	1306	Race Pt.	13	1	50°6.74'	125°19.42'	11	8:35	9:42	2	3	1	1
24	June 22	1303	Deepwater Bay	13	1	50°10.77'	125°21.27'	11	10:05	11:03	2	1	1	1
25	June 22	1302	Discovery Psg.	13	2	50°11.59'	125°22.80'	36	11:15	12:30	3	1	0	1
26	June 22	1302	Discovery Psg.	13	1	50°11.60'	125°22.82'	10	13:00	14:00	1	1	1	1
27	June 22	1305	Maud I.	13	2	50°7.66'	125°20.29'	40	14:25	16:10	1	4	3	1
28	June 23	1305	Maud I.	13	1	50°7.67'	125°20.40'	13	9:25	10:32	1	3	1	3
29	June 23	1308	April Pt.	13	2	50°3.82'	125°14.30'	41	11:05	12:08	1	1	5	1
30	June 23	1308	April Pt.	13	1	50°4.05'	125°14.09'	10	12:15	13:12	1	1	1	1
31	June 24	1314	Bjerre Rock	13	2	50°17.99'	125°19.15'	40	10:00	11:14	0	3	3	4

Appendix Table 1. (Cont.)

Set	Date	Site No.	Site name	SA	Depth Stratum	Latitude	Longitude	Bottom Depth (m)	Start Time	Finish Time	Sea State	Tide	Current	Weather
32	June 24	1314	Bjerre Rock	13	1	50°18.01'	125°19.16'	17	11:20	12:12	1	3	1	4
33	June 24	1315	Okis I.	13	2	50°18.63'	125°16.12'	37	12:50	13:46	0	1	3	4
34	June 24	1315	Okis I.	13	1	50°18.67'	125°15.92'	13	14:00	14:42	0	1	3	4
35	June 25	1307	Copper Cliffs	13	1	50°5.93'	125°16.27'	17	8:25	9:44	1	2	3	4
36	June 25	1302	Discovery Psg.	13	1	50°11.44'	125°22.89'	14	10:30	11:30	1	3	0	6
37	June 25	1305	Maud I.	13	2	50°7.64'	125°20.25'	48	11:45	13:35	1	1	3	6
38	June 28	168	Captain I.	16	1	49°47.31'	123°58.71'	12	11:00	12:00	3	2	1	1
39	June 28	168	Captain I.	16	2	49°47.31'	123°58.84'	42	12:00	12:27	3	2	1	1
40	June 28	166	Hotham S.	16	2	49°49.56'	124°0.19'	37	12:45	13:45	3	2	3	1
41	June 28	166	Hotham S.	16	1	49°49.56'	124°0.19'	12	13:45	14:39	3	2	3	1
42	June 28	216	Hardy I.	16	1	49°44.82'	124°13.63'	17	15:15	16:05	1	3	1	1
43	June 29	73	Texada E	16	2	49°36.65'	124°14.74'	47	9:50	10:29	2	4	1	1
44	June 29	73	Texada E	16	1	49°36.29'	124°14.99'	18	10:34	12:20	2	4	1	1
45	June 29	113	SW Texada	16	1	49°29.78'	124°9.37'	13	13:08	14:30	3	2	1	1
46	June 29	113	SW Texada	16	2	49°29.64'	124°9.30'	40	14:35	15:43	2	2	1	1
47	June 30	242	McNaughton Pt.	16	1	49°34.25'	124°2.46'	14	9:40	10:20	1	1	1	1
48	June 30	242	McNaughton Pt.	16	2	49°34.23'	124°2.60'	45	10:35	11:15	1	1	0	1
49	June 30	234	Temple Rock	16	1	49°37.52'	124°5.90'	12	11:35	12:20	1	4	0	1
50	June 30	234	Temple Rock	16	2	49°37.52'	124°5.55'	42	12:25	13:29	1	2	0	1
51	June 30	201	Agememnon Ch.	16	1	49°39.34'	124°4.38'	11	13:45	14:45	1	2	1	1
52	June 30	201	Agememnon Ch.	16	2	49°39.42'	124°4.53'	35	14:50	15:45	2	2	2	1
53	July 01	216	Hardy I.	16	2	49°44.90'	124°13.70'	40	8:35	9:30	2	1	3	1
54	July 01	223	Nelson I.	16	1	49°41.49'	124°12.35'	18	10:05	10:45	3	1	1	1
55	July 01	223	Nelson I.	16	2	49°41.54'	124°12.29'	40	10:50	11:40	2	1	3	1
56	July 01	216	Hardy I.	16	1	49°45.10'	124°13.40'	15	12:15	13:05	3	4	0	1
57	July 01	168	Captain I.	16	1	49°47.23'	123°58.68'	12	13:40	14:35	4	2	1	1
58	July 04	6	Teakerne Arm	15	1	50°11.20'	124°52.29'	13	9:50	10:50	1	1	1	1
59	July 04	6	Teakerne Arm	15	2	50°11.23'	124°52.59'	30	11:00	11:50	1	1	1	1
60	July 04	27	Junction Pt.	15	1	50°8.31'	124°53.69'	17	13:05	14:05	3	1	3	1
61	July 04	27	Junction Pt.	15	2	50°8.31'	124°53.69'	40	14:10	14:50	3	4	3	1
62	July 05	60	Tenedos Bay	15	1	50°6.23'	124°42.44'	16	9:30	10:23	1	1	1	4
63	July 05	60	Tenedos Bay	15	2	50°6.14'	124°42.44'	36	10:30	11:50	1	1	1	4
64	July 05	103	S. Twin I.	15	1	50°1.12'	124°55.49'	21	12:30	13:25	1	1	1	4

Appendix Table 1. (Cont.)

Set	Date	Site No.	Site name	SA	Depth Stratum	Latitude	Longitude	Bottom Depth (m)	Start Time	Finish Time	Sea State	Tide	Current	Weather
65	July 05	103	S. Twin I.	15	2	50°0.96'	124°55.53'	39	13:30	14:15	1	1	2	4
66	July 05	88	N. Twin I.	15	2	50°2.35'	124°57.29'	32	14:35	16:05	1	4	1	4
67	July 06	56	Mink I.	15	1	50°6.74'	124°46.35'	16	9:45	10:37	3	3	0	4
68	July 06	56	Mink I.	15	2	50°6.81'	124°46.23'	35	10:45	11:50	3	1	3	1
69	July 06	88	N. Twin I.	15	1	50°2.62'	124°56.75'	17	13:35	13:40	3	1	1	1
70	July 06	121	Copeland I.	15	1	49°59.89'	124°47.85'	11	14:00	14:50	3	1	1	1
71	July 07	121	Copeland I.	15	2	49°59.60'	124°47.93'	44	10:00	11:15	4	3	2	4
72	July 08	27	Junction Pt.	15	1	50°8.32'	124°53.68'	16	9:45	10:40	0	3	1	4
73	July 08	27	Junction Pt.	15	2	50°8.36'	124°53.63'	38	10:45	11:40	0	3	0	4
74	July 08	60	Tenedos Bay	15	1	50°6.91'	124°42.51'	17	12:20	13:07	0	1	1	4
75	July 08	60	Tenedos Bay	15	2	50°6.93'	124°42.49'	45	13:20	14:15	1	1	1	4

Appendix Table 2. Effort data by set and depth stratum for each fisher, and number of fish caught by species for the 2004 hook and line survey of lingcod and rockfish (RF) in the Strait of Georgia, June 14 – August 3, 2004. Numbers in brackets indicate fishing effort or number of fish caught while using the 7 (7 kg) leader. Depth stratum (DS) 1 = 0-25 m (shallow); 2 = 26-50 m (deep). Note: In addition to the species indicated, one Chinook salmon smolt was also captured at the surface on a bare hook in set 13 on June 17.

			Effort (minutes)						Total fish	Lingcod	Dogfish	Copper RF	Quillback RF	Yelloweye RF	Kelp greenling	Greenstripe RF	Cabezon	Rock sole
Set	Date	DS	Fisher 1	Fisher 2	Fisher 3	Fisher 4	Fisher 5	Total										
1	June 14	1	18.25	7.5	20	19	--	64.75	3	3	0	0	0	0	0	0	0	0
2	June 14	2	5.5	1.75	9.75	10	--	27	7	0	7	0	0	0	0	0	0	0
3	June 15	2	21.52	15	6.75	12.25	--	55.52	19	1	12	1	4	0	0	0	0	1
4	June 15	1	18.5	24.5	6	18.5	--	67.5	18	4	11	1	2	0	0	0	0	0
5	June 15	2	17	14.5	14	13	--	58.5	11	0	3	0	6	2	0	0	0	0
6	June 16	1	17.5	8.75	17.25	14.5	--	58	3	1	0	2	0	0	0	0	0	0
7	June 16	2	14.75	14.75	16	14.75	--	60.25	5	0	5	0	0	0	0	0	0	0
8	June 16	1	17.5	7.5	18	20	--	63	8	2	2	2	1	0	0	0	0	1
9	June 16	2	12.5	4.5	13	15	--	45	8	0	7	0	0	0	0	0	0	1
10	June 19	1	15.75	11.5	14.25	17	--	58.5	7	5	0	1	0	0	0	0	1	0
11	June 17	2	10	0	12.5	11.75	--	34.25	1	0	0	0	0	0	0	0	0	1
12	June 17	2	19.5	0.25	23	19	--	61.75	10	3	0	1	5	1	0	0	0	0
13	June 17	1	20	11	10	20	--	61	7	1	0	2	1	0	2	0	0	0
14	June 18	1	--	0	16.5	15.5	16.25	48.25	4	3	0	0	1	0	0	0	0	0
15	June 18	1	--	11	0	15.5	14.25	40.75	5	4	0	1	0	0	0	0	0	0
16	June 18	1	--	15.75	0	10.5	15.5	41.75	11	2	0	3	5	0	1	0	0	0
17	June 18	1	--	0	14.75	18.25	14.75	47.75	4	1	0	2	0	0	1	0	0	0
18	June 18	1	--	17.75	16.75	17.5	--	52	9	1	1	3	4	0	0	0	0	0
19	June 21	1	9.75	3.25	19	12	--	0	17	11	0	1	5	0	0	0	0	0
20	June 21	2	0	13.25	10	13	--	36.25	3	1	0	0	1	1	0	0	0	0
21	June 21	2	9.5	3	9.5	12	--	34	13	9	1	0	2	0	1	0	0	0
22	June 21	2	10.5	10.75	0	9.75	--	31	11	5	0	1	5	0	0	0	0	0
23	June 22	1	11.75	7.75	10.75	10	--	40.25	18	11	1	3	2	0	0	0	1	0
24	June 22	1	10.25	13.5	0	12.25	--	36	17	11	0	3	0	0	3	0	0	0
25	June 22	2	10.5	14.25	1.5	11.5	--	37.75	12	2	0	2	7	0	1	0	0	0
26	June 22	1	10.5	2.75	22.5	12.5	--	48.25	16	14	0	2	0	0	0	0	0	0

Appendix Table 2. (Cont.)

Set	Date	DS	Effort (minutes) Fisher 1	Fisher 2	Fisher 3	Fisher 4	Fisher 5	Total	Total fish	Lingcod	Dogfish	Copper RF	Quillback RF	Yelloweye RF	Kelp greenling	Greenstripe RF	Cabezon	Rock sole
27	June 22	2	8.5	0	11	9.5	--	29	10	7	0	1	2	0	0	0	0	0
28	June 23	1	10.5	2.5	13.25	15.5	--	41.75	19	15	0	2	0	0	2	0	0	0
29	June 23	2	9.5	15.5	0	14.75	--	39.75	12	8	0	0	2	0	1	0	1	
30	June 23	1	10.25	10.5	0	12.5	--	33.25	16	8	0	3	1	0	3	0	0	1
32	June 24	1	10.25	16.52	5	13	--	44.77	5	5	0	0	0	0	0	0	0	0
33	June 24	2	0	13.5	10.25	11	--	34.75	1	0	0	0	1	0	0	0	0	0
34	June 24	1	3	12.75	10.5	10.75	--	37	8	6	0	1	1	0	0	0	0	0
35	June 25	1	(10)	--	(14.75)	(14)	--	38.75	14	(6)	0	0	(7)	0	(1)	0	0	0
36	June 25	1	(10)	--	(11)	(11.5)	--	32.5	19	(18)	0	(1)	0	0	0	0	0	0
37	June 25	2	(10)	--	(10)	(10.75)	--	30.75	24	(12)	0	0	(12)	0	0	0	0	0
38	June 28	1	12	10.75	10	(15)	--	47.75	7	3 (1)	0	1 (1)	0	0	1	0	0	0
39	June 28	2	(11)	10.5	1	10.5	--	33	0	0	0	0	0	0	0	0	0	0
40	June 28	2	10.5	(18)	6.75	11	--	46.25	2	2	0	0	0	0	0	0	0	0
41	June 28	1	12	10	(12.25)	10	--	44.25	12	1 (1)	0	5 (1)	1 (3)	0	0	0	0	0
42	June 28	1	10.5	10	10.5	(13.75)	--	44.75	9	7 (2)	0	0	0	0	0	0	0	0
43	June 29	2	(10)	3.5	10	11.25	--	34.75	5	0	0	0	0	0	0	0	0	4 (1)
44	June 29	1	9.5	10	(10)	5	--	34.5	36	14 (10)	0	4 (4)	4	0	0	0	0	0
45	June 29	1	10	(10)	5.5	14.75	--	40.25	28	6	9 (2)	2 (2)	4 (1)	0	2	0	0	0
46	June 29	2	10	10	6.25	(11)	--	37.25	11	2 (2)	1	0	2 (1)	2 (1)	0	0	0	0
47	June 30	1	(10)	0	10	10	--	30	2	0	0 (1)	0	0	0	0	0	0	1
48	June 30	2	8.5	11	(10)	10.25	--	39.75	2	0	0	0	1 (1)	0	0	0	0	0
49	June 30	1	10	(11)	10	10.25	--	41.25	4	4	0	0	0	0	0	0	0	0
50	June 30	2	10	10	12	(11)	--	43	3	2 (1)	0	0	0	0	0	0	0	0
51	June 30	1	(10)	9	10	10.5	--	39.5	6	3 (1)	0	1	0	0	1	0	0	0
52	June 30	2	10	11	(10)	5.5	--	36.5	3	2 (1)	0	0	0	0	0	0	0	0
53	July 01	2	10.5	(11.5)	1.25	10.5	--	33.75	4	0	0	0	2 (1)	0	0	0 (1)	0	0
54	July 01	1	12	9	10	(11)	--	42	4	1 (3)	0	0	0	0	0	0	0	0
55	July 01	2	(11)	13	5.25	11.5	--	40.75	4	3 (1)	0	0	0	0	0	0	0	0
56	July 01	1	5	10.5	(14)	16.5	--	46	4	2	0	1	0 (1)	0	0	0	0	0

Appendix Table 2. (Cont.)

Set	Date	DS	Effort (minutes) Fisher 1	Fisher 2	Fisher 3	Fisher 4	Fisher 5	Total	Total fish	Lingcod	Dogfish	Copper RF	Quillback RF	Yelloweye RF	Kelp greenling	Greenstripe RF	Cabezon	Rock sole
57	July 01	1	15	(11.5)	8.25	(10.5)	--	45.25	7	5 (2)	0	0	0	0	0	0	0	0
58	July 04	1	(10.25)	8	10	12.5	--	40.75	10	3 (2)	0	4	0 (1)	0	0	0	0	0
59	July 04	2	8.5	11.5	(10)	13.75	--	43.75	5	3 (2)	0	0	0	0	0	0	0	0
60	July 04	1	6.25	(13.5)	10	19	--	48.75	7	4 (2)	0	0	1	0	0	0	0	0
61	July 04	2	10.25	14	6	(10.5)	--	40.75	2	0 (1)	0	0	0	0	0	1	0	0
62	July 05	1	10.75	(10)	10	10	--	40.75	11	4 (2)	0	2 (3)	0	0	0	0	0	0
63	July 05	2	15	10	10	5	--	40	7	4 (2)	0	0	0	0 (1)	0	0	0	0
64	July 05	1	14.25	(10)	10	9	--	43.25	13	6 (4)	0	2	0 (1)	0	0	0	0	0
65	July 05	2	9.5	11.5	10	(11.5)	--	42.5	2	0	0	0	2	0	0	0	0	0
66	July 05	2	(10)	10.5	14.5	6.25	--	41.25	23	13 (1)	1	0	2 (3)	0 (1)	1 (1)	0	0	0
67	July 06	1	16	4	(10)	13	--	43	9	7 (1)	0	0	0 (1)	0	0	0	0	0
68	July 06	2	10	(10)	6	15	--	41	7	4 (2)	0	0	1	0	0	0	0	0
69	July 06	1	12.5	11.75	6.5	(10.5)	--	41.25	18	6	0	9 (1)	1	0	1	0	0	0
70	July 06	1	(10.5)	10.25	10	10	--	40.75	5	2 (1)	0	2	0	0	0	0	0	0
71	July 07	2	14.25	4	10.5	13.5	--	42.25	5	2	1	0	0 (1)	0	0	1	0	0
72	July 08	1	10	(10)	10.25	10.5	--	40.75	12	5 (6)	0	1	0	0	0	0	0	0
73	July 08	2	13	10.5	7.5	11.25	--	42.25	4	0	0	1	0 (2)	1	0	0	0	0
74	July 08	1	(10)	10	15	10.25	--	45.25	5	2 (2)	0	0	1	0	0	0	0	0
75	July 08	2	14	8	(11)	9	--	42	4	0 (1)	0	0	0	1	0	1 (1)	0	0
		Total	682.8	568	650.5	813.8	60.75	2731.79	677	356	65	86	116	11	23	5	3	11

Appendix Table 3. Capture depth (m), biological data, fisher ID, and leader weight for lingcod (*Ophiodon elongatus*) captured during the 2004 hook and line survey of lingcod and rockfish in the Strait of Georgia, June 14 – July 8, 2004. For sex and maturity codes, see Appendix Tables 9 and 10. SA = Statistical Area. Depth stratum (DS) 1 = 0-25 m (shallow); 2 = 26-50 m (deep).

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
1	June 14	14	1	21.5	721	3540	2	7	1	11
1	June 14	14	1	9.5	514	1185	2	2	3	11
1	June 14	14	1	22.5	655	2515	1	7	4	11
3	June 15	14	2	42	479	895	1	1	4	11
4	June 15	14	1	22	296	185	1	1	1	11
4	June 15	14	1	22	339	255	2	1	3	11
4	June 15	14	1	24	456	765	1	2	3	11
4	June 15	14	1	24	507	1175	1	7	3	11
6	June 16	14	1	17	602	2310	1	7	4	11
8	June 16	14	1	9	528	1215	2	2	3	11
8	June 16	14	1	6	478	970	1	7	4	11
10	June 19	14	1	15	470	1025	1	2	1	11
10	June 19	14	1	6	472	835	2	1	3	11
10	June 19	14	1	11	480	950	1	2	3	11
10	June 19	14	1	18	477	895	1	1	4	11
10	June 19	14	1	8	496	1075	1	2	4	11
12	June 17	14	2	43	475	840	2	1	1	11
12	June 17	14	2	45	521	1210	2	2	2	11
12	June 17	14	2	45	592	1705	2	2	4	11
13	June 17	14	1	22	444	635	1	2	1	11
14	June 18	17	1	17	463[1]	--	3	--	3	11
14	June 18	17	1	10	545[1]	--	1	--	3	11
14	June 18	17	1	16	448[1]	--	3	--	4	11
15	June 18	17	1	21	710[1]	--	2	--	2	11
15	June 18	17	1	10	655[1]	--	1	--	4	11
15	June 18	17	1	15	448[1]	--	3	--	5	11
15	June 18	17	1	21	590[1]	--	1	--	5	11
16	June 18	17	1	12	426[1]	--	3	--	2	11
16	June 18	17	1	12	476[1]	--	3	--	4	11
17	June 18	17	1	13	510[1]	--	1	--	3	11
18	June 18	17	1	16	486[1]	--	1	--	3	11
19	June 21	13	1	21	441	775	1	2	1	11
19	June 21	13	1	20	603	1990	2	2	1	11
19	June 21	13	1	20	625	2175	2	2	1	11
19	June 21	13	1	24	569	1625	2	2	2	11
19	June 21	13	1	17	698	3100	2	7	2	11
19	June 21	13	1	13	499	1010	1	1	3	11
19	June 21	13	1	20	498	965	2	7	4	11
19	June 21	13	1	18	555	1530	2	7	4	11
19	June 21	13	1	18	588	1965	1	7	4	11
19	June 21	13	1	22	630	2105	2	7	4	11
19	June 21	13	1	15	718	3365	2	2	4	11
20	June 21	13	2	37	597	1900	1	7	2	11

[1]Released

Appendix Table 3. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
21	June 21	13	2	31	529	1400	1	7	1	11
21	June 21	13	2	28	555	1480	1	2	1	11
21	June 21	13	2	28	560	1865	1	7	1	11
21	June 21	13	2	35	641	2655	2	2	1	11
21	June 21	13	2	37	593	1075	1	1	2	11
21	June 21	13	2	33	470	930	1	2	4	11
21	June 21	13	2	43	594	1740	2	2	4	11
21	June 21	13	2	28	595	2040	2	2	4	11
21	June 21	13	2	32	598	2100	1	7	4	11
22	June 21	13	2	48	477	1030	1	7	1	11
22	June 21	13	2	45	446	730	1	1	2	11
22	June 21	13	2	33	470	850	1	2	2	11
22	June 21	13	2	45	525	1320	2	1	2	11
22	June 21	13	2	34	464	810	1	2	4	11
23	June 22	13	1	14		**fish not landed**			1	11
23	June 22	13	1	12	378	420	1	1	1	11
23	June 22	13	1	11	510	1120	1	7	1	11
23	June 22	13	1	11	650	2290	2	7	2	11
23	June 22	13	1	11	416	565	1	2	3	11
23	June 22	13	1	11	467	875	1	7	3	11
23	June 22	13	1	16	468	805	1	2	3	11
23	June 22	13	1	11	495	1060	1	7	3	11
23	June 22	13	1	13	436	670	2	1	4	11
23	June 22	13	1	11	437	705	1	7	4	11
23	June 22	13	1	14	504	1165	1	7	4	11
24	June 22	13	1	11	406	515	2	1	1	11
24	June 22	13	1	10	440	610	2	1	1	11
24	June 22	13	1	20	555	1545	1	7	1	11
24	June 22	13	1	11	435	695	1	1	2	11
24	June 22	13	1	15	480	935	1	7	2	11
24	June 22	13	1	13	528	1150	1	3	2	11
24	June 22	13	1	12		**fish not landed**			4	11
24	June 22	13	1	8	325	225	1	1	4	11
24	June 22	13	1	16	420	555	1	2	4	11
24	June 22	13	1	10	441	640	2	1	4	11
24	June 22	13	1	13	488	1010	1	2	4	11
25	June 22	13	2	25	428	600	1	1	1	11
25	June 22	13	2	42	780	4485	2	6	1	11
26	June 22	13	1	13	396	505	1	1	1	11
26	June 22	13	1	9	424	645	1	1	1	11
26	June 22	13	1	10	426[1]	--	--	--	1	11
26	June 22	13	1	12	501	1045	1	2	1	11
26	June 22	13	1	13	550	1335	2	2	1	11
26	June 22	13	1	9	403	525	1	1	3	11
26	June 22	13	1	13	432	620	1	1	3	11

[1]Released

Appendix Table 3. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
26	June 22	13	1	9	463	760	2	1	3	11
26	June 22	13	1	10	518	1195	1	2	3	11
26	June 22	13	1	13	367	365	1	1	4	11
26	June 22	13	1	10	422	575	1	1	4	11
26	June 22	13	1	10	450	710	2	1	4	11
26	June 22	13	1	20	500[1]	--	--	--	4	11
26	June 22	13	1	9	532	1275	1	2	4	11
27	June 22	13	2	43	683	2940	2	7	1	11
27	June 22	13	2	33	702	3670	1	7	1	11
27	June 22	13	2	34	605	2100	2	7	3	11
27	June 22	13	2	30	635	2355	1	7	3	11
27	June 22	13	2	26	830	5225	2	6	3	11
27	June 22	13	2	36	713	3430	2	7	4	11
27	June 22	13	2	34	758	4725	1	7	4	11
28	June 23	13	1	13	426	595	1	1	1	11
28	June 23	13	1	12	428	610	1	1	1	11
28	June 23	13	1	14	441	700	2	1	1	11
28	June 23	13	1	8	475	895	1	1	1	11
28	June 23	13	1	13	531	1190	1	3	1	11
28	June 23	13	1	7	437	645	1	2	3	11
28	June 23	13	1	11	492	975	1	6	3	11
28	June 23	13	1	12	539	1175	1	7	3	11
28	June 23	13	1	13	570	1600	1	7	3	11
28	June 23	13	1	14	627	2400	2	7	3	11
28	June 23	13	1	11	665	2665	2	6	3	11
28	June 23	13	1	18	445	725	1	2	4	11
28	June 23	13	1	11	470	780	1	2	4	11
28	June 23	13	1	13	481	990	1	7	4	11
28	June 23	13	1	13	493	1060	1	7	4	11
29	June 23	13	2	35	589	1195	1	7	1	11
29	June 23	13	2	39	464	775	2	2	2	11
29	June 23	13	2	40	568	1755	1	7	2	11
29	June 23	13	2	34	631	2150	2	7	2	11
29	June 23	13	2	45	296	185	1	1	4	11
29	June 23	13	2	33	466	870	2	1	4	11
29	June 23	13	2	40	510	1155	1	7	4	11
29	June 23	13	2	36	548	1460	1	7	4	11
30	June 23	13	1	10	405	525	2	2	1	11
30	June 23	13	1	9	415	555	2	1	1	11
30	June 23	13	1	13	492	920	2	1	1	11
30	June 23	13	1	8	464	890	1	2	2	11
30	June 23	13	1	10	507	1080	1	7	2	11
30	June 23	13	1	10	420	585	1	1	4	11
30	June 23	13	1	12	448	835	1	2	4	11
30	June 23	13	1	9	454	820	1	7	4	11

[1]Released

Appendix Table 3. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
31	June 24	13	2	48	709	3545	2	2	2	11
32	June 24	13	1	7		**fish not landed**			1	11
32	June 24	13	1	19	805	5130	2	2	1	11
32	June 24	13	1	17	644	2355	2	2	2	11
32	June 24	13	1	17	931	8435	2	6	2	11
32	June 24	13	1	13	525	1270	1	1	4	11
34	June 24	13	1	15	679	2620	2	2	2	11
34	June 24	13	1	10	686	2765	2	2	2	11
34	June 24	13	1	15	505	1065	2	2	3	11
34	June 24	13	1	13	754	4190	2	6	3	11
34	June 24	13	1	11	928	7970	2	6	3	11
34	June 24	13	1	12	672	2975	1	7	4	11
35	June 25	13	1	17	658	2560	1	7	1	7
35	June 25	13	1	18	680	3035	2	3	1	7
35	June 25	13	1	16	695	2985	2	6	1	7
35	June 25	13	1	17	535	1465	1	7	4	7
35	June 25	13	1	12	581	1785	1	7	4	7
35	June 25	13	1	18	610	1960	1	7	4	7
36	June 25	13	1	20	428	600	1	1	1	7
36	June 25	13	1	16	458	740	1	1	1	7
36	June 25	13	1	18	472	855	1	2	1	7
36	June 25	13	1	15	479	930	1	2	1	7
36	June 25	13	1	10	480	910	1	2	1	7
36	June 25	13	1	11	505	1090	1	2	1	7
36	June 25	13	1	17	509	1150	1	2	1	7
36	June 25	13	1	9	581	2000	1	7	1	7
36	June 25	13	1	14	455	735	2	1	3	7
36	June 25	13	1	14	486	1020	1	2	3	7
36	June 25	13	1	11	500	1020	1	2	3	7
36	June 25	13	1	17	547	1470	2	1	3	7
36	June 25	13	1	12	560	1550	2	1	3	7
36	June 25	13	1	15	401	560	1	1	4	7
36	June 25	13	1	13	473	900	1	7	4	7
36	June 25	13	1	16	482	995	1	2	4	7
36	June 25	13	1	13	498	1000	1	1	4	7
36	June 25	13	1	13	590	1730	2	7	4	7
37	June 25	13	2	30	526	1205	1	7	1	7
37	June 25	13	2	42	594	1900	1	7	1	7
37	June 25	13	2	45	605	1940	2	1	1	7
37	June 25	13	2	34	700	3535	2	6	1	7
37	June 25	13	2	48	960	8825	2	6	1	7
37	June 25	13	2	33	548	1545	1	7	3	7
37	June 25	13	2	46	768	5145	2	3	3	7
37	June 25	13	2	49	818	5395	2	6	3	7
37	June 25	13	2	46	820	4220	2	6	3	7
37	June 25	13	2	32	553	1510	1	7	4	7

Appendix Table 3. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
37	June 25	13	2	44	575	1700	1	7	4	7
37	June 25	13	2	30	880	7370	--	--	4	7
38	June 28	16	1	14	485	915	2	1	1	11
38	June 28	16	1	10	512	1075	--	--	1	11
38	June 28	16	1	9	555	1670	2	2	1	11
38	June 28	16	1	11	544	1505	2	2	4	7
40	June 28	16	2	28	461	745	1	3	1	11
40	June 28	16	2	37	621	1945	2	2	1	11
41	June 28	16	1	10	550	1490	1	7	1	11
41	June 28	16	1	10	555	1600	1	7	3	7
42	June 28	16	1	24	435	625	1	7	1	11
42	June 28	16	1	20	458	688	2	1	1	11
42	June 28	16	1	15	483	940	2	1	1	11
42	June 28	16	1	17	462	850	1	2	3	11
42	June 28	16	1	17	520	1115	1	7	3	11
42	June 28	16	1	23	545	1270	2	1	3	11
42	June 28	16	1	18	628	2265	1	7	3	11
42	June 28	16	1	17	454	800	1	2	4	7
42	June 28	16	1	25	480	880	2	1	4	7
44	June 29	16	1	20	485	975	1	2	1	11
44	June 29	16	1	20	515	1095	2	2	1	11
44	June 29	16	1	19	574	1695	2	2	1	11
44	June 29	16	1	19	618	1970	2	6	1	11
44	June 29	16	1	21	645	2450	2	6	1	11
44	June 29	16	1	14	670	2645	2	6	1	11
44	June 29	16	1	17	442	685	1	1	2	11
44	June 29	16	1	12	509	1145	2	2	2	11
44	June 29	16	1	11	511	1220	1	7	2	11
44	June 29	16	1	12	608	1830	2	6	2	11
44	June 29	16	1	12	425	590	2	1	3	7
44	June 29	16	1	19	453	754	1	7	3	7
44	June 29	16	1	15	483	930	2	2	3	7
44	June 29	16	1	16	488	990	1	7	3	7
44	June 29	16	1	22	497	1025	1	7	3	7
44	June 29	16	1	11	507	1110	1	2	3	7
44	June 29	16	1	24	508	1140	1	7	3	7
44	June 29	16	1	18	512	1165	1	7	3	7
44	June 29	16	1	16	530	1210	2	2	3	7
44	June 29	16	1	18	540	1300	2	2	3	7
44	June 29	16	1	23	475	930	1	7	4	11
44	June 29	16	1	18	587	1620	2	2	4	11
44	June 29	16	1	21	647	2260	2	6	4	11
44	June 29	16	1	14	685	2975	2	6	4	11
45	June 29	16	1	13	432	645	2	2	1	11
45	June 29	16	1	11	481	970	1	2	1	11
45	June 29	16	1	15	495	1020	1	2	1	11

Appendix Table 3. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
45	June 29	16	1	21	416	605	1	2	3	11
45	June 29	16	1	13	515	1210	1	7	4	11
45	June 29	16	1	15	518	1210	1	2	4	11
46	June 29	16	2	40	474	900	1	2	1	11
46	June 29	16	2	32	516	1255	2	2	2	11
46	June 29	16	2	36	358	765	1	7	4	7
46	June 29	16	2	35	496	925	1	2	4	7
49	June 30	16	1	12	445	740	1	2	3	11
49	June 30	16	1	17	472	840	1	2	3	11
49	June 30	16	1	9	606	2175	1	7	3	11
49	June 30	16	1	25	624	2245	1	7	4	11
50	June 30	16	2	28	465	820	1	7	1	11
50	June 30	16	2	28	464	810	2	1	3	11
50	June 30	16	2	28	550	1445	1	2	4	7
51	June 30	16	1	10	454	780	1	1	1	7
51	June 30	16	1	12	485	945	1	1	1	7
51	June 30	16	1	11	550	1400	2	1	1	7
51	June 30	16	1	8	487	1075	1	1	2	11
52	June 30	16	2	30	718	2915	2	6	3	7
52	June 30	16	2	26	454	735	2	1	4	11
52	June 30	16	2	44	594	1755	2	2	4	11
54	July 01	16	1	15	535	1435	1	7	1	11
54	July 01	16	1	19		**fish not landed**			4	7
54	July 01	16	1	18	499	940	2	1	4	7
54	July 01	16	1	18	667	2800	2	6	4	7
55	July 01	16	2	30	475	930	1	7	1	7
55	July 01	16	2	30	494	950	1	7	2	11
55	July 01	16	2	38	576	1745	1	7	2	11
55	July 01	16	2	30	484	855	1	7	4	11
56	July 01	16	1	20	405	555	1	1	4	11
56	July 01	16	1	15	515	1095	2	2	4	11
57	July 01	16	1	10	510	1075	2	2	1	11
57	July 01	16	1	11	518	1170	1	7	1	11
57	July 01	16	1	12	538	1410	1	7	1	11
57	July 01	16	1	15	541	1810	1	7	2	7
57	July 01	16	1	12	599	1045	2	2	2	7
57	July 01	16	1	12	530	1395	1	7	4	11
57	July 01	16	1	10	612	2190	1	7	4	11
58	July 04	15	1	14	500	1065	2	7	1	7
58	July 04	15	1	15	526	1410	2	2	1	7
58	July 04	15	1	9	491	1020	1	7	2	11
58	July 04	15	1	11	512	1200	2	2	2	11
58	July 04	15	1	15	430	740	1	2	4	11
59	July 04	15	2	27	580	1795	1	7	2	11
59	July 04	15	2	26	515	1215	2	2	3	7
59	July 04	15	2	28	625	2310	2	2	3	7

Appendix Table 3. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
59	July 04	15	2	28	537	1210	2	2	4	11
59	July 04	15	2	26	593	1815	1	7	4	11
60	July 04	15	1	20	416	605	1	2	1	11
60	July 04	15	1	19	449	795	1	2	2	7
60	July 04	15	1	22	528	1240	2	2	2	7
60	July 04	15	1	14	525	1310	2	7	3	11
60	July 04	15	1	11	515	1205	2	2	4	11
60	July 04	15	1	24	613	2115	2	3	4	11
61	July 04	15	2	43	628	2375	2	2	4	7
62	July 05	15	1	19	455	920	1	2	1	7
62	July 05	15	1	16	459	815	1	7	1	7
62	July 05	15	1	18	450	785	1	7	2	11
62	July 05	15	1	16	534	370	1	2	3	11
62	July 05	15	1	15	590	2130	1	7	3	11
62	July 05	15	1	15	425	625	1	1	4	11
63	July 05	15	2	38	587	1730	2	2	1	11
63	July 05	15	2	36	716	2905	2	3	1	11
63	July 05	15	2	36	564	1680	2	6	3	7
63	July 05	15	2	29	624	2115	2	2	3	7
63	July 05	15	2	33	539	1280	2	2	4	11
63	July 05	15	2	38	654	2265	2	6	4	11
64	July 05	15	1	19	444	705	1	1	1	11
64	July 05	15	1	22	472	850	1	2	1	11
64	July 05	15	1	14	450	735	1	2	2	7
64	July 05	15	1	20	472	935	1	2	2	7
64	July 05	15	1	21	507	1140	2	2	2	7
64	July 05	15	1	15	511	1350	1	7	2	7
64	July 05	15	1	13	551	1350	2	2	3	11
64	July 05	15	1	13	586	1865	2	7	3	11
64	July 05	15	1	18	415	630	1	1	4	11
64	July 05	15	1	20	492	1040	1	7	4	11
66	July 05	15	2	34	646	3090	2	7	1	7
66	July 05	15	2	32	520	1130	1	2	2	11
66	July 05	15	2	32	538	1350	1	7	2	11
66	July 05	15	2	30	641	2380	1	7	2	11
66	July 05	15	2	31	421	620	1	1	3	11
66	July 05	15	2	34	488	925	1	2	3	11
66	July 05	15	2	30	508	1065	1	7	3	11
66	July 05	15	2	35	541	1395	2	1	3	11
66	July 05	15	2	28	543	1435	2	2	3	11
66	July 05	15	2	29	600	1810	2	2	3	11
66	July 05	15	2	34	614	2190	1	7	3	11
66	July 05	15	2	32	647	2675	1	7	3	11
66	July 05	15	2	40	715	3410	2	6	3	11
66	July 05	15	2	39	630	2155	2	2	4	11
67	July 06	15	1	24	533	1220	2	3	1	11

Appendix Table 3. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
67	July 06	15	1	20	559	1750	2	2	1	11
67	July 06	15	1	28	707	2980	2	6	1	11
67	July 06	15	1	16	490	1025	1	7	3	7
67	July 06	15	1	14		**fish not landed**			4	11
67	July 06	15	1	17	470	835	1	2	4	11
67	July 06	15	1	22	605	1990	2	7	4	11
67	July 06	15	1	17	632	2530	2	2	4	11
68	July 06	15	2	30	459	810	1	2	2	7
68	July 06	15	2	34	650	2265	2	3	2	7
68	July 06	15	2	35	900	6720	2	6	3	11
68	July 06	15	2	36	500	1100	2	2	4	11
68	July 06	15	2	29	554	1520	1	7	4	11
68	July 06	15	2	34	645	2380	1	7	4	11
69	July 06	15	1	18	479	925	1	2	1	11
69	July 06	15	1	25	489	1070	1	7	1	11
69	July 06	15	1	17	424	655	2	1	2	11
69	July 06	15	1	18	486	930	2	2	2	11
69	July 06	15	1	21	505	1190	2	1	2	11
69	July 06	15	1	24	592	1875	2	2	3	11
70	July 06	15	1	18	313	205	1	1	1	7
70	July 06	15	1	10	560	1500	2	2	3	11
70	July 06	15	1	15	476	960	2	1	4	11
71	July 07	15	2	32	419	640	1	2	2	11
71	July 07	15	2	47	633	2270	2	2	4	11
72	July 08	15	1	16	438	590	2	1	1	11
72	July 08	15	1	18	555	1575	2	2	1	11
72	July 08	15	1	16	454	795	1	2	2	7
72	July 08	15	1	24	471	985	1	2	2	7
72	July 08	15	1	12	524	1225	2	2	2	7
72	July 08	15	1	20	526	1220	2	2	2	7
72	July 08	15	1	20	552	1475	1	7	2	7
72	July 08	15	1	16	791	5005	2	6	2	7
72	July 08	15	1	20	485	920	2	2	3	11
72	July 08	15	1	16	485	1040	2	2	3	11
72	July 08	15	1	12	468	870	2	2	4	11
74	July 08	15	1	15	469	855	1	2	1	7
74	July 08	15	1	19	517	1165	2	2	1	7
74	July 08	15	1	22	481	955	1	2	3	11
74	July 08	15	1	19	618	1970	2	2	3	11
75	July 08	15	2	25	596	1780	2	7	3	7

Appendix Table 4. Capture depth (m), biological data, fisher ID, and leader weight for Copper rockfish (*Sebastes caurinus*) captured during the 2004 hook and line survey of lingcod and rockfish in the Strait of Georgia, June 14 – July 8, 2004. For sex and maturity codes, see Appendix Tables 9 and 10. SA = Statistical Area. Depth stratum (DS) 1 = 0-25 m (shallow); 2 = 26-50 m (deep). Except where noted, fish were frozen at the end of each field day and sampled at a later date.

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
3	June 15	14	2	43	344	740	2	7	3	11
4	June 15	14	1	16	359	830	1	7	4	11
6	June 16	14	1	24	332	730	1	7	3	11
6	June 16	14	1	23	420	1460	2	7	4	11
8	June 16	14	1	5	351	730	2	7	1	11
8	June 16	14	1	9	264	330	1	2	4	11
10	June 19	14	1	12	210	170	2	1	4	11
12	June 17	14	2	42	336	630	2	3	4	11
13	June 17	14	1	24	322	620	2	3	1	11
13	June 17	14	1	12	287	440	1	3	4	11
15	June 18	17	1	12	308[1]	--	3	--	4	11
16	June 18	17	1	11	349[1]	--	3	--	4	11
16	June 18	17	1	12	292[1]	--	3	--	5	11
16	June 18	17	1	12	305[1]	--	3	--	5	11
17	June 18	17	1	10	240[1]	--	--	--	4	11
17	June 18	17	1	10	368[1]	--	--	--	4	11
18	June 18	17	1	8	274[1]	--	3	--	2	11
18	June 18	17	1	12	318[1]	--	3	--	2	11
18	June 18	17	1	6	325[1]	--	3	--	4	11
19	June 21	13	1	18	354	800	1	7	4	11
22	June 21	13	2	40	399	1180	2	3	4	11
23	June 22	13	1	14	315	540	1	7	3	11
23	June 22	13	1	9		**fish not landed**			4	11
23	June 22	13	1	11	274	360	1	2	4	11
24	June 22	13	1	10	279	410	1	7	2	11
24	June 22	13	1	11	288	480	1	3	4	11
24	June 22	13	1	11	312	530	2	3	4	11
25	June 22	13	2	34	346	720	1	7	2	11
25	June 22	13	2	37	341	780	2	7	4	11
26	June 22	13	1	13	266	330	1	1	3	11
26	June 22	13	1	8	283	380	2	2	4	11
27	June 22	13	2	50	356	950	2	6	3	11
28	June 23	13	1	7		**fish not landed**			1	11
28	June 23	13	1	13	339	632	1	3	1	11
30	June 23	13	1	14	278	383	1	3	2	11
30	June 23	13	1	7	239	255	1	2	4	11
30	June 23	13	1	10	288	403	2	3	4	11
34	June 24	13	1	13	337	709	2	3	3	11
36	June 25	13	1	18	290	423	1	2	4	7
38	June 28	16	1	9	260	279	2	2	1	11
38	June 28	16	1	9	203	164	1	2	4	7
41	June 28	16	1	12	289	387	2	3	1	11

[1]Fish measured in the field and released.

Appendix Table 4. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
41	June 28	16	1	11	256	287	1	2	2	11
41	June 28	16	1	11	266	295	1	3	2	11
41	June 28	16	1	10	195	128	1	2	3	7
41	June 28	16	1	11	231	184	2	3	4	11
41	June 28	16	1	11	275	333	2	7	4	11
44	June 29	16	1	10	230	205	1	2	1	11
44	June 29	16	1	13	247	258	1	7	1	11
44	June 29	16	1	15	308	466	1	7	1	11
44	June 29	16	1	19	245[1]	--	--	--	2	11
44	June 29	16	1	8		**fish not landed**			3	7
44	June 29	16	1	7		**fish not landed**			3	7
44	June 29	16	1	10	229	172	2	3	3	7
44	June 29	16	1	15	234	235	1	2	3	7
45	June 29	16	1	12	249	268	1	3	1	11
45	June 29	16	1	10	211	151	1	2	2	7
45	June 29	16	1	14	257	272	1	2	2	7
45	June 29	16	1	13	265	282	1	3	3	11
51	June 30	16	1	9	229	223	2	7	4	11
56	July 01	16	1	16	264	276	1	2	1	11
58	July 04	15	1	12	244	240	2	3	1	7
58	July 04	15	1	10	293	415	1	7	1	7
58	July 04	15	1	13	249	256	1	7	2	11
58	July 04	15	1	12	256	263	2	3	3	11
62	July 05	15	1	9	228	191	1	2	1	7
62	July 05	15	1	16	243	202	2	7	1	7
62	July 05	15	1	16	271	314	1	7	1	7
62	July 05	15	1	10	189	116	1	1	2	11
62	July 05	15	1	8	191	108	1	1	3	11
64	July 05	15	1	13	303	424	1	7	1	11
64	July 05	15	1	12	262	294	1	3	4	11
69	July 06	15	1	13	224	192	1	2	1	11
69	July 06	15	1	19	259	262	2	7	1	11
69	July 06	15	1	8	270	350	1	3	1	11
69	July 06	15	1	12	347	661	2	7	1	11
69	July 06	15	1	12	227	197	1	2	2	11
69	July 06	15	1	12	240	217	2	7	2	11
69	July 06	15	1	13	255	294	1	3	2	11
69	July 06	15	1	13	210	144	1	2	3	11
69	July 06	15	1	15	246	245	1	2	3	11
69	July 06	15	1	9	273	325	1	2	4	7
70	July 06	15	1	8	244	251	2	2	3	11
70	July 06	15	1	10	225	199	2	3	4	11
72	July 08	15	1	16	243	269	1	3	3	11
73	July 08	15	2	44	372[2]	890	1	1	3	11

[1]Fish measured in the field and released.
[2]Fish sampled in the field.

Appendix Table 5. Capture depth (m), biological data, fisher ID, and leader weight for Quillback rockfish (*Sebastes maliger*) captured during the 2004 hook and line survey of lingcod and rockfish in the Strait of Georgia, June 14 – July 8, 2004. For sex and maturity codes, see Appendix Tables 9 and 10. SA = Statistical Area. Depth stratum (DS) 1 = 0-25 m (shallow); 2 = 26-50 m (deep). Except where noted, fish were frozen at the end of each field day and sampled at a later date.

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
3	June 15	14	2	42	337	690	2	3	2	11
3	June 15	14	2	38	289	430	2	3	4	11
3	June 15	14	2	36	304	480	1	7	4	11
3	June 15	14	2	38	317	600	2	3	4	11
4	June 15	14	1	24	361	940	1	3	1	11
4	June 15	14	1	22	357	860	2	7	3	11
5	June 15	14	2	33	321	680	2	3	1	11
5	June 15	14	2	44	332	670	1	7	1	11
5	June 15	14	2	35	286	470	1	3	4	11
5	June 15	14	2	48	294	550	1	3	4	11
5	June 15	14	2	38	301	510	2	3	4	11
5	June 15	14	2	25	334	740	2	3	4	11
8	June 16	14	1	4	318	550	1	7	2	11
12	June 17	14	2	49	339	730	1	7	1	11
12	June 17	14	2	44	349	740	2	3	1	11
12	June 17	14	2	50	248	290	2	2	4	11
12	June 17	14	2	43	314	510	1	7	4	11
12	June 17	14	2	50	345	750	2	3	4	11
13	June 17	14	1	24	241	270	1	3	3	11
14	June 18	17	1	20	310[1]	--	3	--	5	11
16	June 18	17	1	17	320[1]	--	3	--	2	11
16	June 18	17	1	17	248[1]	--	3	--	4	11
16	June 18	17	1	12	275[1]	--	3	--	4	11
16	June 18	17	1	17	325[1]	--	3	--	4	11
16	June 18	17	1	18	260[1]	--	3	--	5	11
18	June 18	17	1	11	206[1]	--	3	--	2	11
18	June 18	17	1	20	185[1]	--	3	--	3	11
18	June 18	17	1	13	239[1]	--	3	--	3	11
18	June 18	17	1	8	343[1]	--	3	--	3	11
19	June 21	13	1	19	197	150	2	1	2	11
19	June 21	13	1	20	271	390	1	7	2	11
19	June 21	13	1	20	277	400	2	7	2	11
19	June 21	13	1	22	265	380	2	3	3	11
19	June 21	13	1	19	188	140	2	1	4	11
20	June 21	13	2	27	277	430	2	3	4	11
21	June 21	13	2	35	320	680	2	7	2	11
21	June 21	13	2	35	271	380	2	1	4	11
22	June 21	13	2	35	290	560	1	2	1	11
22	June 21	13	2	50	337	690	1	7	2	11
22	June 21	13	2	37	230	230	2	2	4	11
22	June 21	13	2	43	295	480	1	2	4	11
22	June 21	13	2	50	341	740	1	7	4	11

[1]Fish measured in the field and released.

Appendix Table 5. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
23	June 22	13	1	20	283	440	2	7	3	11
23	June 22	13	1	15	271	450	2	3	4	11
25	June 22	13	2	39	226	190	2	2	1	11
25	June 22	13	2	30	234	240	2	2	1	11
25	June 22	13	2	36	291	420	2	7	1	11
25	June 22	13	2	41	233	230	2	2	2	11
25	June 22	13	2	36	245	240	1	1	4	11
25	June 22	13	2	39	289	460	2	1	4	11
25	June 22	13	2	30	292	440	2	3	4	11
27	June 22	13	2	45	294	500	2	2	1	11
27	June 22	13	2	32	317	610	2	6	4	11
29	June 23	13	2	40	330	651	2	3	2	11
29	June 23	13	2	40	294	537	2	2	4	11
30	June 23	13	1	11		**fish not landed**			4	11
31	June 24	13	2	43	217	186	1	2	2	11
31	June 24	13	2	36	284	399	1	7	2	11
31	June 24	13	2	43	226	210	1	2	3	11
31	June 24	13	2	43	254	331	1	7	4	11
31	June 24	13	2	40	272	414	1	7	4	11
31	June 24	13	2	45	293	477	2	3	4	11
33	June 24	13	2	32	324	650	2	3	3	11
34	June 24	13	1	13	295	485	1	7	4	11
35	June 25	13	1	17	207	182	2	2	1	7
35	June 25	13	1	18	289	461	2	3	1	7
35	June 25	13	1	16	183	110	1	1	3	7
35	June 25	13	1	20	267	351	2	3	3	7
35	June 25	13	1	17	299	473	2	3	3	7
35	June 25	13	1	14	175	103	2	1	4	7
35	June 25	13	1	18	284	466	1	3	4	7
37	June 25	13	2	43	301	536	1	7	1	7
37	June 25	13	2	50	310	657	1	7	1	7
37	June 25	13	2	44	314	697	2	3	1	7
37	June 25	13	2	40	200[1]	--	--	--	3	7
37	June 25	13	2	49	263	362	1	2	3	7
37	June 25	13	2	50	286	535	2	3	3	7
37	June 25	13	2	48	308	644	1	3	3	7
37	June 25	13	2	48	313	590	2	7	3	7
37	June 25	13	2	40	327	681	2	3	3	7
37	June 25	13	2	48	346	898	2	3	3	7
37	June 25	13	2	48	317	612	2	3	4	7
37	June 25	13	2	30	329	756	1	3	4	7
41	June 28	16	1	14	217	202	1	2	3	7
41	June 28	16	1	11	235	215	1	2	3	7
41	June 28	16	1	14	245	241	2	2	3	7
41	June 28	16	1	13	248	286	2	7	4	11

[1]Fish measured in the field and released.

Appendix Table 5. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
44	June 29	16	1	13	223	179	1	2	1	11
44	June 29	16	1	7		**fish not landed**			2	11
44	June 29	16	1	10	268	313	2	7	2	11
44	June 29	16	1	19	268	323	1	7	4	11
45	June 29	16	1	14	208	154	2	2	2	7
45	June 29	16	1	12	186	113	1	1	3	11
45	June 29	16	1	11	177	97	1	1	4	11
45	June 29	16	1	14	223	194	1	2	4	11
45	June 29	16	1	17	255	297	1	7	4	11
46	June 29	16	2	27	206	145	1	1	1	11
46	June 29	16	2	32	181	124	1	1	2	11
46	June 29	16	2	27	302	514	1	7	4	7
48	June 30	16	2	47	218	186	1	1	3	7
48	June 30	16	2	47	206	166	2	2	4	11
53	July 01	16	2	38	188	118	2	2	2	7
53	July 01	16	2	50	167	79	2	1	4	11
53	July 01	16	2	48	223	206	2	2	4	11
56	July 01	16	1	11	306	471	1	3	3	7
58	July 04	15	1	9	234	206	1	2	1	7
60	July 04	15	1	15	227	195	2	2	4	11
64	July 05	15	1	12	266	353	1	7	2	7
65	July 05	15	2	34	250	311	2	7	3	11
65	July 05	15	2	40	258	324	1	7	3	11
66	July 05	15	2	28	246	250	1	2	1	7
66	July 05	15	2	33	280	374	1	3	1	7
66	July 05	15	2	33	326	690	2	3	1	7
66	July 05	15	2	33	302	503	2	2	2	11
66	July 05	15	2	27	216	178	2	2	3	11
67	July 06	15	1	25	239	215	1	7	3	7
68	July 06	15	2	26	244	259	1	2	3	11
69	July 06	15	1	11		**fish not landed**			2	11
71	July 07	15	2	48	266	325	2	2	3	7
73	July 08	15	2	40	209	161	2	2	4	7
73	July 08	15	2	46	289	496	1	3	4	7
74	July 08	15	1	12	288	350	2	3	2	11

Appendix Table 6. Capture depth (m), biological data, fisher ID, and leader weight for dogfish (*Squalus acanthias*) captured during the 2004 hook and line survey of lingcod and rockfish in the Strait of Georgia, June 14 – July 8, 2004. For sex codes, see Appendix Table 9. SA = Statistical Area. Depth stratum (DS) 1 = 0-25 m (shallow); 2 = 26-50 m (deep).

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Sex	Fisher	Leader weight (kg)
2	June 14	14	2	36	622	1	1	11
2	June 14	14	2	38	589	1	3	11
2	June 14	14	2	49	594	2	3	11
2	June 14	14	2	28	638	2	3	11
2	June 14	14	2	48	696	2	3	11
2	June 14	14	2	47	589	2	4	11
2	June 14	14	2	50	700	1	4	11
3	June 15	14	2	44	625	2	1	11
3	June 15	14	2	38	534	2	2	11
3	June 15	14	2	29	624	1	2	11
3	June 15	14	2	37	630	1	2	11
3	June 15	14	2	30	735	1	2	11
3	June 15	14	2	42	800	2	2	11
3	June 15	14	2	43	621	2	3	11
3	June 15	14	2	29	671	1	3	11
3	June 15	14	2	37	--	1[1]	4	11
3	June 15	14	2	38	730	2	4	11
3	June 15	14	2	29	735	1	4	11
3	June 15	14	2	38	800	--	4	11
4	June 15	14	1	22	753	1	1	11
4	June 15	14	1	23	964	2	1	11
4	June 15	14	1	16	744	1	2	11
4	June 15	14	1	22	764	1	2	11
4	June 15	14	1	22	822	1	3	11
4	June 15	14	1	16	**not landed**		4	11
4	June 15	14	1	23	577	2	4	11
4	June 15	14	1	22	675	1	4	11
4	June 15	14	1	20	695	1	4	11
4	June 15	14	1	22	831	2	4	11
4	June 15	14	1	22	888	1	4	11
5	June 15	14	2	27	630	2	3	11
5	June 15	14	2	40	560	--	4	11
5	June 15	14	2	--	644	1	4	11
7	June 16	14	2	43	614	2	1	11
7	June 16	14	2	43	697	1	2	11
7	June 16	14	2	39	770	2	2	11
7	June 16	14	2	37	744	1	4	11
7	June 16	14	2	38	780	1	4	11
8	June 16	14	1	17	722	1	1	11
8	June 16	14	1	17	727	1	3	11
9	June 16	14	2	39	630	1	1	11
9	June 16	14	2	37	**not landed**		3	11
9	June 16	14	2	47	547	2	3	11

[1]Fish observed but not landed

Appendix Table 6. (Cont.)

Set	Date	SA	DS	Capture depth (m)	Length (mm)	Sex	Fisher	Leader weight (kg)
9	June 16	14	2	48	689	1	3	11
9	June 16	14	2	27	804	1	3	11
9	June 16	14	2	47	543	2	4	11
9	June 16	14	2	37	798	1	4	11
18	June 18	17	1	17	706	1	4	11
21	June 21	13	2	34	770	1	4	11
23	June 22	13	1	14	**not landed**		2	11
45	June 29	16	1	12	**not landed**		1	11
45	June 29	16	1	14	**not landed**		1	11
45	June 29	16	1	14	**not landed**		1	11
45	June 29	16	1	15	700	1	1	11
45	June 29	16	1	12	705		1	11
45	June 29	16	1	19	730	1	1	11
45	June 29	16	1	12	754	1	1	11
45	June 29	16	1	13	780	1	1	11
45	June 29	16	1	13	570	2	2	7
45	June 29	16	1	19	618	2	2	7
45	June 29	16	1	13	810	2	4	11
46	June 29	16	2	36	665	1	1	11
47	June 30	16	1	18	1000		1	7
66	July 05	15	2	29	--	2[1]	2	11
71	July 07	15	2	33	--	--	4	11

[1]Fish observed but not landed

Appendix Table 7. Capture depth (m), biological data, and fisher ID for Chinook salmon (*Oncorhynchus tshawytscha*)[1], Greenstripe rockfish (*Sebastes elongatus*), Yelloweye rockfish (*S. ruberrimus*), Kelp greenling (*Hexagrammos decagrammus*), Cabezon (*Scorpaenichthys marmoratus*), and Rock sole (*Lepidopsetta bilineata*) captured during the 2004 hook and line survey of lingcod and rockfish in the Strait of Georgia, June 14 – July 8, 2004. For sex and maturity codes, see Appendix Tables 9 and 10. SA = Statistical Area. Depth stratum (DS) 1 = 0-25 m (shallow); 2 = 26-50 m (deep).

Species	Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
Chinook smolt[1]	13	June 17	14	1	--	112	--	--	--	4	11
Greenstripe rockfish	53	July 01	16	2	27	167[2]	59	2	1	2	7
	61	July 04	15	2	50	152[2]	37	2	1	1	11
	71	July 07	15	2	--	261[2]	223	2	3	2	11
	75	July 08	15	2	--	197[2]	95	2	2	3	7
	75	July 08	15	2	15	199[2]	85	2	2	4	11
Yelloweye rockfish	5	June 15	14	2	33	264[2]	340	2	2	2	11
	5	June 15	14	2	36	494[2]	2130	2	7	3	11
	12	June 17	14	2	40	148[2]	60	1	1	4	11
	20	June 21	13	2	42	173[2]	80	2	1	4	11
	46	June 29	16	2	36	343	640	2	1	1	11
	46	June 29	16	2	36	450	1470	2	7	1	11
	46	June 29	16	2	39	528	2765	2	4	4	7
	63	July 05	15	2	38	279[2]	448	2	2	3	7
	66	July 05	15	2	29	422[2]	1300	2	2	1	7
	73	July 08	15	2	31	444	1305	2	2	1	11
	75	July 08	15	2	49	420	1220	1	1	2	11
Kelp greenling	13	June 17	14	1	15	322	470	2	3	1	11
	13	June 17	14	1	17	376	715	2	3	3	11
	16	June 18	17	1	19	395[3]	--	2	--	4	11
	17	June 18	17	1	6	369[3]	--	1	--	3	11
	21	June 21	13	2	42	373	745	1	--	2	11
	24	June 22	13	1	11	331	480	2	2	1	11
	24	June 22	13	1	10	416	1000	2	--	2	11
	24	June 22	13	1	12	382	790	2	6	4	11
	25	June 22	13	2	36	314	405	1	7	4	11
	28	June 23	13	1	13	435	1220	2	3	3	11
	28	June 23	13	1	15	365	675	1	2	4	11
	29	June 23	13	2	40	343	650	2	2	4	11
	30	June 23	13	1	9	437	1065	2	6	1	11
	30	June 23	13	1	11	316	375	1	1	2	11
	30	June 23	13	1	9	393	855	2	6	2	11
	35	June 25	13	1	16	352[3]	--	1	--	1	7
	38	June 28	16	1	10	360	610	1	6	3	11
	45	June 29	16	1	12	316	445	1	2	1	11
	45	June 29	16	1	12	305	656	2	2	4	11
	51	June 30	16	1	17	346	555	2	2	1	7

[1]Single Chinook salmon smolt was caught on a bare hook at the surface.
[2]Fish frozen at the end of the field day and sampled in the lab at a later date.
[3]Released.

Appendix Table 7. (Cont.)

Species	Set	Date	SA	DS	Capture depth (m)	Length (mm)	Weight (g)	Sex	Maturity	Fisher	Leader weight (kg)
Kelp greenling	66	July 05	15	2	32	315	395	1	1	1	7
	66	July 05	15	2	32	370	645	1	7	3	11
	69	July 06	15	1	16	362	665	2	6	1	11
Cabezon	10	June 19	14	1	22	410[3]	--	--	--	3	11
	23	June 22	13	1	14	445[3]	--	--	--	1	11
	29	June 23	13	2	30	592[3]	--	--	--	1	11
Rock sole	3	June 15	14	2	42	261	--	--	--	4	11
	8	June 16	14	1	17	255	--	--	--	4	11
	9	June 16	14	2	27	297[3]	--	--	--	4	11
	11	June 17	14	2	48	335[3]	--	--	--	4	11
	30	June 23	13	1	17	314[3]	--	--	--	1	11
	43	June 29	16	2	32	346[3]	--	--	--	1	7
	43	June 29	16	2	32	325[3]	--	--	--	2	11
	43	June 29	16	2	44	254[3]	--	--	--	3	11
	43	June 29	16	2	31	215[3]	--	--	--	4	11
	43	June 29	16	2	45	280	--	--	--	4	11
	47	June 30	16	1	15	306	--	--	--	3	11

[1]Single Chinook salmon smolt was caught on a bare hook at the surface.
[2]Fish frozen at the end of the field day and sampled in the lab at a later date.
[3]Released.

Appendix Table 8. Codes used to describe sea state, tide, current, and weather.

Code	Description
Sea State	
1	calm
2	ripple
3	chop
4	swell
Tide	
1	ebb
2	flood
3	high
4	low
Current	
0	none
1	weak (minimal)
2	moderate-weak
3	moderate
4	moderate-strong
5	strong
Weather	
1	sun
2	rain
3	partly cloudy
4	overcast
5	high cloud
6	fog/overcast

Appendix Table 9. Codes used to indicate sex.

Code	**1**	**2**	**3**	**Blank (--)**
Description	Male	Female	Unknown	Not examined

Appendix Table 10. Reproductive maturity codes.

Maturity Stage	Male	Female
	Lingcod or Greenling (Hexagrammidae)	
STAGE 1: Immature	• Testes threadlike to ribbonlike • Colour transparent-white to white	• Ovaries small and translucent • Colour pink or white-pink • Eggs not visible
STAGE 2: Maturing - small	• Testes larger, ribbonlike • Colour white to very 7 brown	• Ovaries fill about 1/4 to 1/3 of body cavity • Colour orange and opaque or semi-translucent • Blood vessels pronounced on the ovary
STAGE 3: Maturing - large	• Testes fill 1/3 of body cavity • Colour whiter than in Stage 2	• Ovaries fill about 1/3 to 2/3 of body cavity • Colour orange. • Blood vessels pronounced on the ovary • Eggs opaque
STAGE 4: Mature	• Testes fill 1/3 to 2/3 of body cavity • Colour white • Cross sectioning of testis produces sperm at centre of tissue	• Ovaries fill 2/3 to 4/5 of the body cavity • Eggs opaque • Colour orange to white
STAGE 5: Ripe	• Testes fill 2/3 or more of the body cavity • Colour white • Testis lobes fully developed • Sperm released from vent with s7 pressure on body exterior	• Ovaries fill near all of the body cavity • Colour opaque orange to white • Eggs may be loose inside the ovary
STAGE 6: Spent	• Testes moderate in size • Colour tan-brown with some white still evident • Cross sectioning of testis reveals some remaining sperm in centre of gonad	• Ovaries fill 1/3 to 2/3 of the body cavity. • Colour purple and may be bloodshot. • Ovaries flaccid; some eggs may remain • Reabsorbing • Recovering
STAGE 7: Resting	• Testes relatively smaller and firm • Colour tan-brown	• Ovaries fill less than 1/3 of the body cavity • Colour often pink • Ovaries firm
	Rockfish (*Sebastes spp.*)	
STAGE 1: Immature	• Testes are translucent and string-like. • Located in the back of the body cavity	• Ovaries are translucent and very small • Colouring can be clear, amber, or yellow
STAGE 2: Maturing - small	• Testes are ribbon-like and swelling in size • Colour is translucent-white or brown-white	• Ovaries developing for this year's cycle but still relatively small • Ovaries semi-translucent or opaque • Colouring usually yellow, but can be 7 pink
STAGE 3: Maturing - large	• Testes are large • Colour is translucent-white	• Ovaries large and contain eggs that can be distinguished by direct observation • Eggs opaque and orange-yellow or cream
STAGE 4: Mature	• Testes are very large and easily broken • Colour is white	• Ovaries are large • Eggs are translucent and orange-yellow or cream
STAGE 5: Ripe	• Testes are very large with free flowing sperm • Colour is white • Sperm is running when gonad is cut or fish's body cavity is pressed	• Ovaries large and full of eyed eggs or larvae • Eyed eggs translucent yellow with visible black dots • Larvae grey to grey-green with black dots • Eyed eggs and larvae flow freely from vent when pressure applied to body cavity
STAGE 6: Spent	• Testes are smaller. • Colour is creamy-brown. • When testes are broken, some remaining sperm is evident but is of a thicker consistency, not flowing	• Ovaries large and flaccid • Colour red to red-purple • A few larvae may be present
STAGE 7: Resting	• Testes are smaller and ribbon-like • Colour is brown	• Ovaries firm and moderate in size • Colour red-grey; some with black blotches